

PROGRESSIVE  
MEDICINE







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1911

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# PROGRESSIVE MEDICINE

A QUARTERLY DIGEST OF ADVANCES, DISCOVERIES  
AND IMPROVEMENTS

IN THE

## MEDICAL AND SURGICAL SCIENCES

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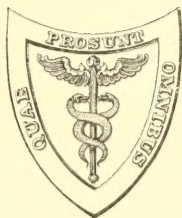
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VOLUME IV. DECEMBER, 1911

DISEASES OF THE DIGESTIVE TRACT AND ALLIED ORGANS, THE LIVER, PANCREAS  
AND PERITONEUM—DISEASES OF THE KIDNEYS—SURGERY OF THE  
EXTREMITIES, SHOCK, ANESTHESIA, INFECTIONS, FRACTURES AND  
DISLOCATIONS, AND TUMORS—GENITO-URINARY DISEASES—  
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# PROGRESSIVE MEDICINE

DECEMBER, 1911

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## DISEASES OF THE DIGESTIVE TRACT AND ALLIED ORGANS, THE LIVER, PANCREAS, AND PERITONEUM

BY R. S. LAVENSON, M.D.

### DISEASES OF THE ESOPHAGUS

**Atony of the Esophagus.** Under this term Holzkecht and Olbert<sup>1</sup> describe a condition for the recognition of which they assume more or less credit. Their observations were made exclusively by skiagraphy, which, in their opinion, is the only means by which the condition may be recognized. They found the condition to be a surprisingly common one both in persons presenting symptoms of digestive disturbance and those presenting no such symptoms.

To properly understand the radiographic findings which characterize atony of the esophagus, we must make brief mention of the normal radiographic picture as described by Holzkecht and Olbert. When a person swallows food of soft consistency, the portions of food take first the form of a large drop as they enter the esophagus from the pharynx; as these descend into the thoracic portion of the esophagus, they become somewhat elongated and of more uniform diameter, assuming something of a finger-like form; just before entering the cardia the mass of food becomes somewhat shorter and thicker. The progress of a mouthful of soft food in four phases of its progress from mouth to stomach is shown in Fig. 1. The radiographic characteristics of atony of the esophagus are shown in Fig. 2; here, instead of a small compact mass of food as is normally seen, there is a long thin column seen, extending practically from the pharynx to the cardia. It must be noted that both of these descriptions refer only to the taking of soft food, not to either solid or liquid food.

<sup>1</sup> Zeitsch. f. klin. Med., 1910, Band lxxi, Heft 1 and 2, p. 91.



The authors found the condition in conjunction with general atony of other hollow viscera, but more often as an independent phenomenon resulting from catarrh of various types (alcohol, nicotine, and infections). The majority of the patients who presented these findings had

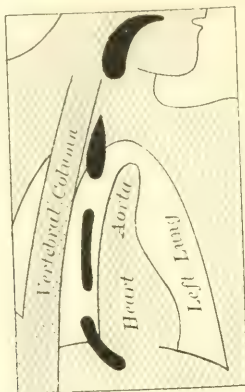


FIG. 1.—Diagrammatic representation of four phases of the passage of soft food in the normal esophagus. (After Holzkmnecht and Olbert.)

no symptoms referable to the esophagus. In a number of cases, however, the patients complained of more or less severe symptoms referable directly to esophageal disturbance—regurgitation, dysphagia, globus, tickling in the throat, coughing after swallowing, fear of eating in the presence of others, attacks of choking. Upon passing an esophageal sound, no obstructions nor other abnormalities were discovered.

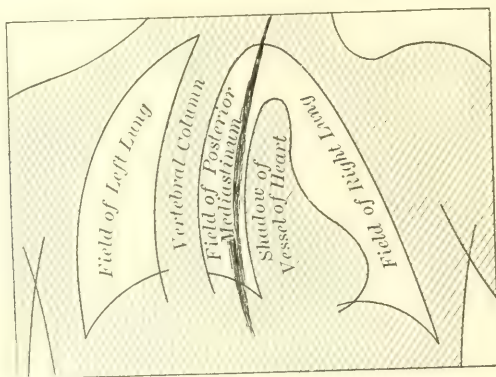


FIG. 2.—Diagrammatic representation of the passage of soft food in the atonic esophagus. (After Holzkmnecht and Olbert.)

The symptoms are in many cases not unlike those generally considered characteristic of esophagism. The two conditions can, however, be at once differentiated by an attempt to pass an esophageal sound; in esophagism, a spastic contraction is met when the sound reaches

the cardia; in atony, no obstruction is met. Holzkecht and Olbert believe that many of the cases which have hitherto been described as esophagism in which the cardia is by chance found to be relaxed are actually cases of esophageal atony. They consequently propose the name "pseudo-esophagism" as applicable to the condition they describe.

On account of the fact that the radiographic features characteristic of esophageal atony are found in many patients who are entirely without esophageal symptoms, there must be some other factor which is responsible for the development of symptoms; this other factor is undoubtedly some condition referable to the nervous system, hysteria, neurasthenia, or a general lack of nervous tone, such as is manifested by persons of the asthenic habitus. The relationship that these nervous conditions bear to atony of the esophagus as a clinical picture is well shown by the histories of the cases which the authors relate; all of them showed distinct manifestations of one of the functional nervous disorders. This gives something of a hint of the treatment of atony of the esophagus, which consists entirely of those measures which are serviceable in the treatment of the functional nervous disorders.

Rosenheim<sup>1</sup> agrees with Holzkecht and Olbert in that there is a distinct clinical entity which may be spoken of as atony of the esophagus, but claims for himself the credit of having recognized the condition, and contends, furthermore, that it is not by means of radiographic studies alone that the condition can be recognized. Holzkecht and Olbert,<sup>2</sup> replying to Rosenheim, admit his priority in description of the disease, but contend that it is only by means of the radiograph that the condition can be accurately diagnosticated. They admit, however, that the existence of the condition can be strongly suspected when the symptoms of esophagism are present and there is no obstruction to the passage of an esophageal sound.

**Idiopathic Dilatation of the Esophagus.**—It is impossible to determine, from the remarks of Holzkecht and Olbert, what relationship they believe to exist between the esophageal atony which they describe and the esophageal atony which is generally considered to be of etiological importance in idiopathic dilatation of the esophagus. They do not mention this condition in their article, and probably believe that the two conditions are not etilogically related. If, however, the atony which they describe is a forerunner of idiopathic dilatation of the esophagus, then the view that the latter is not always a result of cardiospasm receives considerable support.

The *etiology* of so-called idiopathic dilatation of the esophagus continues to be a matter of as much uncertainty and discussion as ever. Mikulicz and Meltzer hold that there is always a primary spasm

<sup>1</sup> Zeitsch. f. klin. Med., 1910, Band lxxi, Heft 3 to 6, p. 478.

<sup>2</sup> Ibid., 1911, Band lxxii, Heft 3 and 4, p. 373.



of the cardia, which induces hypertrophy and subsequently dilatation of the esophagus. Rosenheim, on the other hand, claims that an esophageal atony is the primary lesion, and only as this leads to changes in the mucosa does cardiospasm add itself to the picture. Fleiner believes that a congenital anomaly or weakness of the esophagus, especially in its lower portion, is responsible for the subsequent dilatation. Kraus contends that both the atony and the spasm are the results of the same cause, a paralysis of various fibers of the pneumogastric nerves. There is some support for Kraus' view in the fact that section of the pneumogastric nerve in the neck results in relaxation of the upper portion of the esophagus and spasm in the lower portion. Furthermore, Kraus found atrophy of both pneumogastric nerves at autopsy in a patient who died with idiopathic dilatation of the esophagus with cardiospasm. The experimental basis for Kraus' view is, however, somewhat weakened by the fact that the digestive organs possess their own nervous centres, which impart to them more or less independence of the rest of the nervous system, and Openchowski has demonstrated that the cardia possesses its own reflex and tone centres in groups of ganglion cells which lie just underneath the serosa.

Various anatomical peculiarities have from time to time been held responsible for the dilatation. Included among these are the physiological point of narrowing where the esophagus passes through the diaphragm and the angular insertion of the esophagus in the stomach. Best,<sup>1</sup> reporting several instances of the condition under discussion, calls attention to the importance of these anatomical peculiarities in the pathogenesis of esophageal dilatation. There are, moreover, many features which characterize the histories of patients with idiopathic dilatation of the esophagus, which may be of more or less etiological importance. Such are insufficient chewing of the food, rapid swallowing and bolting; the rapid drinking of cold liquids, especially beer, is not infrequently held by the patient to be responsible for the onset of symptoms. It is not impossible that indiscretions of this sort may give rise to an esophagitis, which, in turn, may cause spasm, which finally results in dilatation. Hysteroneurasthenic states seem also to play some part in the etiology of the condition, and in several instances the onset has dated from some emotional or nervous shock.

Myer<sup>2</sup> calls attention to a very important fact which he noticed in the majority of the patients with idiopathic dilatation coming under his observation, namely, that they were subjects of the asthenic habitus. He mentions the frequency with which the hollow viscera in persons of this type exhibit phenomena of both atony and spasticity. This fact is of great importance in considering the therapeutics of the con-

<sup>1</sup> *Archiv f. Verdauungskrankheiten*, 1910, Band xvi, Heft 4, p. 464.

<sup>2</sup> *Journal of the American Medical Association*, 1910, vol. lv, No. 18, p. 1544.

dition, but it does not seem to have been accorded much attention by the writers on the subject.

Janczurowicz<sup>1</sup> contends that whether the esophageal dilatation is primary or secondary, it is dependent on esophageal atony. In support of this view, he mentions the frequency with which functional and especially organic stenosis of the cardia is encountered, unattended by dilatation of the esophagus. He believes, moreover, that in those cases in which the dilatation of the esophagus is primary, there is no actual pyloric spasm, but only a simulation thereof, by reason of the fact that though the upper portion of the esophagus has lost its tone, the lower portion, especially the cardia, has retained its tone and its normal tendency to contracture. This author reports three cases in which dilatation and cardiospasm occurred together. In *PROGRESSIVE MEDICINE* for December, 1910, I mentioned two cases, one reported by Umber, the other by May, in which there was esophageal dilatation apparently without cardiospasm. In this connection, however, it is worth recording the contention of Janczurowicz, that we are not justified in drawing conclusions concerning the pathogenesis of the condition by observing the relations as they exist late in the disease or at autopsy.

It is not a question of academic importance alone as to the relationship between cardiospasm and dilatation of the esophagus, but one of considerable importance from the therapeutic standpoint. With so many different views and hypotheses concerning the condition, it is difficult to select one which fits all cases and does justice to the opinion of the various observers.

It is undoubtedly true that cardiospasm occurs in conjunction with most cases of idiopathic dilatation of the esophagus, but it is also true that many cases of cardiospasm as well as organic stricture of the cardia occur without subsequent dilatation of the esophagus; there must, therefore, be some other factor than cardiospasm alone to account for the complete picture. This other factor is undoubtedly an acquired, or more probably a congenital, atony of the esophagus, which is probably in many instances but the local expression of a general asthenic habitus. On the other hand, the cases of Umber and May, mentioned above, as well as the radiographic observations of Holzknacht and Olbert, make it seem probable that atony and dilatation can occur quite independent of cardiospasm. We are thus forced to conclude that probably the majority of cases are due to cardiospasm associated with a tendency to atonic dilatation of the esophagus, but that some cases are probably a result of atony of the esophagus alone, either entirely unassociated with cardiospasm or associated with it only as a secondary manifestation.

<sup>1</sup> Internat. Beitr. zur Path. u. Therap. d. Ernährungsstörungen, 1911, Band ii, Heft 4, p. 461.

**THERAPEUTICS.** The therapeutic results that some observers, especially Plummer<sup>1</sup> and Einhorn<sup>2</sup> have obtained by dilatation of the cardia would seem to indicate that all cases of idiopathic dilatation are dependent upon cardiospasm. These clinicians report the most gratifying results from dilatation of the cardia in all of their cases of idiopathic dilatation. Myer suggests that the remarkable cures occasionally encountered are a result of the fact that the patients, if only partially relieved, are, nevertheless, so much more comfortable than they previously were that they are inclined to exaggerate the degree of improvement they have experienced.

Einhorn describes a new instrument which he has devised for the purpose of dilating the cardia, and reports a remarkable case as a result of its employment, in which the esophagus, as observed in the radiograph, appeared to be but one-third the size in diameter after treatment than it had been before.

**Esophageal Examinations.** Plummer<sup>3</sup> writes an instructive article on the *technique of the examination of esophageal lesions* and the instruments employed therein. Unfortunately, the article does not lend itself well to being abstracted.

Callmann<sup>4</sup> describes a *flexible sound* which he claims can be used as a substitute for the palpating finger in esophageal lesions, and is of great service in differentiating the rough, uneven surface of a malignant stricture from the smooth surface of a benign or spasmodic one.

**Esophageal Stenosis.** Jackson<sup>5</sup> reports four cases of esophageal stenosis from the swallowing of caustic alkali, and emphasizes the need of laws to control the sale, or at least the labelling, of articles containing caustic substances.

The *cure of a case of fibrous stricture of the esophagus by means of fibrolysin* is reported by Ploch.<sup>6</sup> The case may be an authentic one, but, as no basis whatever could be discovered for the existence of a fibrous stricture, one is probably justified in entertaining the suspicion that there may have been an hysterical element in the case. Since the fibrolysin is administered hypodermically, we find sufficient basis for improvement in the hysterical condition in the psychic effect of this form of medication.

**Succussion Splash in Pulsion Diverticulum.** Cooper<sup>7</sup> describes the occurrence of a succussion splash as a phenomenon which he has found to be of distinct value in the diagnosis of pulsion diverticulum. The

<sup>1</sup> Journal of the American Medical Association, 1911, vol. lvi, No. 8, p. 560.

<sup>2</sup> American Journal of the Medical Sciences, 1910, vol. cxi, No. 4, p. 536.

<sup>3</sup> Journal of the American Medical Association, 1911, vol. lvi, No. 8, p. 560.

<sup>4</sup> Deutsche med. Wochenschrift, 1911, No. 11, p. 497.

<sup>5</sup> Journal of the American Medical Association, 1910, vol. lv, No. 22, p. 1857.

<sup>6</sup> Deutsche med. Wochenschrift, 1911, No. 8, p. 358.

<sup>7</sup> Journal of the American Medical Association, 1910, vol. lv, No. 10, p. 856.



method of eliciting the sign is as follows: The patient is requested to drink as much water as possible, preferably at a time when the diverticulum is most likely to be empty, as in the early morning. The larynx is then grasped by the hand and the soft tissues of the neck vigorously shaken. The patient is requested not to breathe or swallow during the performance of the test. Cooper states that under these conditions the examiner, with the ear near the patient's neck, can readily hear the splash of the fluid in the sac.

**Carcinoma of the Esophagus.** Brünings<sup>1</sup> describes an instrument that he claims to be of great aid in the diagnosis of carcinoma of the esophagus. The instrument consists of an ordinary flexible staff of the esophageal sound, on the lower end of which is fastened a hollow metal olive, bearing two lateral windows. Depending upon the size of the lumen of the esophagus, a larger or smaller olive is used. When one of the proper size is introduced and withdrawn, sufficient portions of the carcinomatous mass will, according to Brünings, be found within the hollow interior of the olive to permit of either macroscopic or microscopic diagnosis.

**Tuberculosis of the Esophagus.** Staehelin-Burckhardt<sup>2</sup> describes the pathological features of a case of tuberculosis of the esophagus and discusses the various features of the pathology and pathogenesis of this rather rare localization of tuberculosis.

**Esophagus in Enlargement of the Heart.** Kovacs and Stoerk<sup>3</sup> have made a postmortem and radiographic study of the effect of enlargement of the heart upon the esophagus. They found at autopsy that enlargement of the heart, especially enlargement of the left auricle, produced profound changes in both the course and the form of the esophagus. The alteration in the course consisted in a posterior and right lateral bowing of the esophagus; the alteration in the form consisted in the flattening of the esophagus, especially in its lower one-half, against the vertebral column. The radiographic studies were made after the employment of bismuth paste and bismuth capsules. The radiographs taken after the swallowing of the bismuth paste showed a marked bowing of the esophagus as mentioned in the description of the postmortem findings; the radiographs taken after the swallowing of the bismuth capsules showed various degrees of retardation in the descent of the capsules at the point of greatest compression. In one instance, despite vigorous attempts at swallowing, the capsule remained for fifteen minutes at the point of greatest compression. The authors mention that these findings appear to have no clinical significance.

<sup>1</sup> Münch. med. Wochenschrift, 1910, No. 47, p. 2479.

<sup>2</sup> Archiv f. Verdauungskrankheiten, 1910, Band xvi, Heft 4, p. 484.

<sup>3</sup> Wiener klinische Wochenschrift, 1910, No 42, p. 1471.

## DISEASES OF THE STOMACH

**Test Breakfast versus Appetite Breakfast.** Since Pawlow first directed our attention to the importance of appetite, or at least a desire to partake of food, as a stimulant to the flow of gastric juice, various observers have contended that the test breakfast, as ordinarily administered, does not produce a gastric secretion that in any wise expresses the functional capacity of the stomach. This is probably even more true in this country than abroad, for the composition of the test breakfast does not differ so materially from the usual continental breakfast as it does from that generally partaken by residents of this country. Fischer,<sup>1</sup> in recognition of this, undertook a comparative study of the results of the usual test breakfast and other breakfasts which he calls "appetite breakfasts" in the same individuals.

The composition of the "appetite breakfast" was left, to an extent, to the patient's choice—300 c.c. of either milk, coffee, tea, bouillon, or weak lemonade were allowed, in addition to 75 grams of bread and 20 grams of butter and 2 eggs, or 70 grams of raw meat, ham, or sausage. Fischer found that in many cases the "appetite breakfast" gave a much truer picture of the functional capacity of the stomach than did the test breakfast. In the majority of cases he found the "appetite breakfast" alone to be sufficient for the diagnosis; in cases suggestive of carcinoma, however, he found that the result of the ordinary test breakfast contributed additional evidence of value. Even the "appetite breakfast" does not, in all cases, express the maximum functional capacity of the stomach, for this is expressed only by a meal which entirely conforms to the patient's appetite; nevertheless, Fischer believes that in most cases it gives much more reliable diagnostic and therapeutic helps than does the usual test breakfast.

**Appetite and Gastric Juice.** In this connection some observations by Hertz and Sterling<sup>2</sup> on a patient with a gastric fistula, similar to those I made and reported in *PROGRESSIVE MEDICINE* for December, 1910, are of interest. Their experiments indicated that chemical stimuli had no influence on the secretion of gastric juice; however, in the light of all the evidence to the contrary, they admit that great reliance should not be placed in these results. The especially interesting conclusion at which they arrived, however, is that the appetite is not dependent upon a secretion of gastric juice. Appetite is a manifestation of desire, quite independent of gastric juice, and may be experienced by persons who have very little secretion of gastric juice and even by those whose stomachs have been excised. Despite these results of Hertz and

<sup>1</sup> Münchener med. Wochenschrift, 1911, No. 7, p. 345.

<sup>2</sup> Deutsche med. Wochenschrift, 1910, No. 31, p. 1441.

Sterling, experimental and clinical evidence points strongly to an intimate relationship between appetite and the secretion of gastric juice.

**Fear and Test Breakfasts.** Another objection that has frequently been raised against the test breakfast, as ordinarily employed, is that the patient's natural fear and apprehension of the procedure are bound to materially alter the results of its administration. This objection is, of course, also based upon the works of Pawlow, who showed that the various emotions, especially fear, anger, and the like, have a profound influence upon the secretion of gastric juice. Grandauer<sup>1</sup> undertook a series of investigations to determine the influence that the emotions, especially fear, ordinarily attending the administration of a test breakfast have upon the results of its administration. He administered breakfasts frequently to the same individuals, subsequently determining on which of these administrations the patients had fear of the procedure, and when they had become sufficiently accustomed to it so that they no longer entertained any fear; furthermore, he gave test breakfasts to subjects who were not aware that they were to undergo anything unusual, and consequently had no fear; finally, he administered test breakfasts to patients who feared the procedure on previous administrations, but who were this time assured that the meal was given for other purposes, and that no subsequent expression of it was to be undertaken. As a result of all these experiments, Grandauer was able to demonstrate that in the vast majority of instances the fear incident to the administration of a test breakfast appreciably inhibits the secretion of gastric juice.

**Foodstuffs as Stimulants to Gastric Secretion.** It is well known from the works of Edkins, and Bayliss and Starling, that the absorbed products of digestion in various stages act as stimulants to the functional activity of various portions of the gastro-intestinal tract. Such substances are generally known under the term of "hormones." Studies of the influence of somewhat different substances upon the gastric secretion were made by Eisenhardt.<sup>2</sup> He studied the effect upon gastric secretion of the injection into the blood current of various components of the ordinary foodstuffs. He found that most of the ordinary articles of diet contained, in addition to the nutritive element, readily absorbable substances which through the blood current were able to stimulate a flow of gastric juice. It is rather interesting to note that in spinach he found a substance which was unusually active in stimulating the gastric juice.

**Sodium Chloride as a Stimulant to Gastric Secretion.** Wilenko<sup>3</sup> studied the effect upon gastric secretion of the injection of a concentrated

<sup>1</sup> *Deutsches Archiv f. klin. Med.*, 1910, Band ci, Heft 3 and 4, p. 302.

<sup>2</sup> *Internat. Beiträge z. Path. u. Therap. d. Ernährungsstörungen*, 1911, Band ii, Heft 2, p. 206.

<sup>3</sup> *Ibid.*, p. 214.



sodium chloride solution into the blood current. He found that the intravenous injection of a concentrated sodium chloride solution caused an increased secretion in the normal stomach, but a decrease in a stomach whose extragastric nerve supply had been destroyed or removed.

**Effect of Radium on Gastric Secretion.** Winternitz<sup>1</sup> studied the effect of radium emanations upon gastric secretion, and found that they had no effect even when administered in relatively large doses upon the response to a test meal.

**Dry versus Wet Test Meals.** To determine the comparative results of dry and wet test breakfasts, Chace<sup>2</sup> gave 47 patients dry and wet test breakfasts on alternate mornings for a series of days. The dry breakfast consisted of merely a roll, and the wet breakfast of a roll and 400 c.c. of water. In each case the total volume of stomach contents, the free hydrochloric acid, and the total hydrochloric acid were determined. In 33 of the cases, the acidity was greater after the dry breakfast than after the wet; in 14, it was greater after the wet breakfast than after the dry, though the differences were in no case very marked. The volume obtained after a wet test breakfast was in practically all cases greater than after the dry test breakfast. These results led Chace to conclude that the dilution of the gastric juice by water is greater than the stimulating effect of water on the peptic glands. No definite relationship could be made out between the volume and the acidity. In all cases of pyloric stenosis, the results obtained after a wet test breakfast were greater than those obtained after a dry test breakfast. In myasthenia gastrica, in which there is delayed motility, the results regarding the acidity obtained after a dry test meal were usually greater than those obtained after a wet test meal, because in the case of the wet test water remains in the stomach and dilutes the juice. Chace believes that in cases of disordered motility, the dry test breakfast gives a more accurate index of the secretory function of the stomach than the wet.

**Motor Functions of the Stomach.** An extremely exhaustive study of the motor functions of the stomach in various gastric disorders was made by Kemp.<sup>3</sup> For this purpose, he administered a test meal which he devised especially for the determination of the gastric motor functions. It consists of 250 c.c. of oatmeal gruel, 50 grams of chopped, cooked veal, 4 pieces of buttered French bread, 8 stewed prunes, and 1 dessertspoonful of berry compote. He classifies the degree of motor insufficiency according to the size of the particles retained, and the

<sup>1</sup> Internat. Beiträge z. Path. u. Therap. d. Ernährungsstörungen, 1911, Band ii, Heft 4, p. 446.

<sup>2</sup> Journal of the American Medical Association, 1911, vol. lvii, No. 1, p. 23.

<sup>3</sup> Internat. Beiträge z. Path. u. Therap. d. Ernährungsstörungen, 1910, Band ii, Heft 1, p. 61.

time they are still found in the stomach as "retention," "slight retention," and "microscopic retention."

The most important results of his investigations were: That a normal stomach is entirely empty in three to five hours after the administration of the above-mentioned test meal; that in no cases were any large particles of food found five hours after administration, and this period can consequently be taken as the normal maximum. There were apparently no differences in the two sexes. Frequently microscopic particles could be found twelve hours after the meal, but microscopic retention cannot be looked upon as necessarily indicative of abnormality. In no cases of intestinal disorder was gastric retention found. In practically all gastric disorders, however, especially organic disorders, some degree of retention was found. The more outspoken the retention, the greater is the probability of organic diseases; if a high degree of retention is found, an organic disease of the stomach is certain to be the cause, though this need not necessarily be of the nature of a mechanical obstruction at the pylorus. In its milder forms retention is of no significance in the differential diagnosis between the various organic gastric disorders. If, however, the differential diagnosis lies between a primary gastric disorder and a primary intestinal disorder with secondary gastric symptoms, the presence of retention, even of slight degree, points strongly to the diagnosis of a gastric disorder. Normal motility does not exclude the existence of an organic gastric disease. In general, the milder degrees of retention and the gastric disorders responsible for them can be eradicated by the appropriate medical treatment. If they should, on the other hand, prove refractory to treatment or should become worse under treatment, the prognosis becomes more unfavorable, for an increase in the retention can generally be looked upon as denoting progression of the disease.

These conclusions of Kemp seem rather interesting, especially in view of the fact that they would seem to permit more reliable deductions in regard to the degree of motor insufficiency than is the case with other methods. His statements, however, that intestinal disorders are not accompanied by even slight degrees of motor insufficiency of the stomach are not in accord with clinical experience. I have not infrequently observed motor insufficiency which all of the clinical evidence indicated was due purely to an intestinal disorder, and I believe that O. Cohnheim observed the same phenomenon in some of his experimental work.

Galambos<sup>1</sup> determines the amount of total contents in the stomach after a test breakfast and uses the result as an indicator of the motor powers of the stomach. He removes the stomach contents an hour and a half after the test breakfast is given, using a slight modification of the Mathieu-Remond method to determine the total contents.

<sup>1</sup> Zeitschr. f. klin. Med., 1911, Band lxxii, Heft 5 and 6, p. 555.

**Shape of Normal Stomach.** There has been long and ardent discussion among Röntgenologists, as well as gastro-enterologists and anatomists, as to the form of the normal stomach. It has been generally conceded, though not without strong objections on the part of many anatomists and gastro-enterologists, that the form of the stomach as is usually depicted in the text-books is entirely wrong for the normal living subject. There has, however, been contention among Röntgenologists as to which form of stomach found in apparently normal individuals by different observers may be really designated as the normal stomach. The two leaders in this controversy are Groedel and Holz-knecht. Holz-knecht claims that the normal stomach is represented by what the Germans term the steer's horn form, in which the pylorus is on a level with the lowest point of the body of the stomach. Groedel believes that the normal is represented by what the Germans call the fish-hook form, in which the pylorus is on a considerably higher level than the lowermost point of the body of the stomach. Schlesinger<sup>1</sup> believes

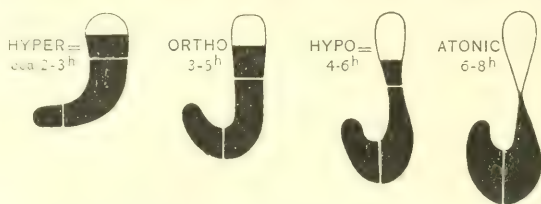


FIG. 3.—Diagrammatic representation of four types of stomach found in individuals who may present no gastric symptoms—hypertonic, orthotonic, hypotonic, and atonic. The figures represent the number of hours in which these various types of stomach empty themselves. (After Schlesinger.)

that both of these types may be considered normal for individuals with different degrees of gastric tonus, and, in fact, that all of the different forms of stomach observed in individuals presenting no gastric symptoms may be considered as representing merely different degrees of tonus. He represents four types of stomach with different degrees of tonus in the accompanying diagram.<sup>2</sup>

**Tests for Hydrochloric Acid.** **SODIUM BICARBONATE TEST.** Fuld<sup>3</sup> describes a new and extremely simple test for the presence of free acid in the stomach. In a subsequent article<sup>4</sup> he gives credit for priority in the origination of the test to Dr. L. A. Benedict, of Buffalo, who has used the test for a number of years. The test consists in the administration of a small quantity of sodium bicarbonate to the patient at an appropriate lapse of time after the administration of a test meal; the

<sup>1</sup> Berliner klin. Wochenschr., 1910, No. 43, p. 1977.

<sup>2</sup> From Holz-knecht, Berliner klin. Wochenschr., 1911, No. 4, p. 158.

<sup>3</sup> Berliner klin. Wochenschr., 1910, No. 44, p. 2009.

<sup>4</sup> Ibid., 1911, No. 16, p. 717.



physician then auscultates over the stomach, and if free hydrochloric acid is present, it will be recognized by the bubbling of the  $\text{CO}_2$ , thus generated, up through the liquid. Fuld presents innumerable arguments, some of them rational, some of them very much forced, to establish the importance of his test, and thinks that it should be performed as a routine measure in general diagnosis, as is the urine examination. He thinks that thus numerous diagnoses of carcinoma of the stomach will be made that otherwise would not be made. Fuld has, undoubtedly, overestimated the importance of the test. Its greatest advantage seems to lie in its simplicity, and for this reason may be recommended for more or less general employment, especially in cases in which, for one reason or another, the usual method of removal of a test meal cannot be employed. I doubt, however, if it will ever be a test of much importance in the accurate diagnosis of gastric disease.

**PAPER TEST FOR FREE HYDROCHLORIC ACID.** Another new test for free hydrochloric acid is described by Holmgren.<sup>1</sup> His test is based upon the fact that when a watery solution of hydrochloric acid is placed upon filter paper, the water spreads out over a larger area than does the hydrochloric acid. He has had prepared appropriate filter paper which is soaked in a Congo solution. By this means the radius of the circles made by the water and the hydrochloric acid when a drop of solution is placed on the paper may be read. By means of a formula that Holmgren has calculated, the percentage of free hydrochloric acid can be estimated. Holmgren finds that his method usually gives higher values for hydrochloric acid than does the titration test with dimethylamidoazobenzol, but that there is no definite relationship between the values determined by the two methods. He, however, contents himself with the statement that his is a "*method sui generis*."

If Holmgren's test gives, as he says, higher values than titration with dimethylamidoazobenzol, it probably is of little value according to recent investigations of Christiansen,<sup>2</sup> who compared the amount of free hydrochloric acid determined by means of the usual tests with that obtained by calculating the *O-ion concentration*. He found that Gunzburg's reagent gave values which were approximately the same as those indicated by the *O-ion concentration*, but that dimethylamidoazobenzol and Congo paper gave values which were considerably too high. He concluded further that tropeolin and methyl-violet were not at all applicable for use in gastric analysis.

Michaelis and Davidsohn,<sup>3</sup> also studying gastric acidity by means of *O-ion concentration* determinations, and comparing the results so determined with those obtained by means of the ordinary colorimetric titration methods, concluded that none of the latter gave reliable values,

<sup>1</sup> Deutsche med. Wochenschr., 1911, No. 6, p. 247.

<sup>2</sup> Deutsches Archiv f. klin. Med., 1911, Band cii, Heft 1 and 2, p. 103.

<sup>3</sup> Zeitschr. f. exp. Path. u. Therap., 1910, Band viii, Heft 21, p. 398.

and that for real accurate analysis it is necessary to determine the O-ion concentration.

**Total Absolute Hydrochloric Acid.** Schütz<sup>1</sup> contends that the determination of the total absolute hydrochloric acid is of much more significance than the calculation of either the free hydrochloric acid or the total percentage hydrochloric acid. The most important reason for his contention is that the total absolute hydrochloric acid is subject to the influence of fewer undetermined factors than either of the other two determinations. This can be seen from the following table, in which are tabulated the factors which influence each of the determinations:

Free hydrochloric acid.	Total percentage hydrochloric acid.	Total absolute hydrochloric acid.
1. Amount of hydrochloric acid secreted.	1. Amount of hydrochloric acid secreted.	1. Amount of hydrochloric acid secreted.
2. Regurgitation of duodenal contents.	2. Regurgitation of duodenal contents.	2. Regurgitation of duodenal contents.
3. Amount of gastric contents which at the time of expression has passed from stomach into intestines.	3. Amount of gastric contents which at the time of expression has passed from stomach into intestines.	3. Amount of gastric contents which at the time of expression has passed from stomach into intestines.
4. The degree of dilution which the hydrochloric acid has undergone from the contents of the test meal.	4. The degree of dilution which the hydrochloric acid has undergone from the contents of the test meal.	4. Is not a factor.
5. The amount of diluting secretion.	5. The amount of diluting secretion.	5. Is not a factor.
6. The combinations with albumin, mucus, etc.	6. Is not a factor.	6. Is not a factor.

By comparing the total absolute hydrochloric acid with the total percentage hydrochloric acid, Schütz has made some interesting observations, especially concerning hyperacidity. Some cases of hyperacidity show a decreased absolute hydrochloric acid, associated with a small amount of stomach contents, others a high absolute amount of hydrochloric acid with a large amount of stomach contents. These various conditions are, of course, results of the varying inter-relationships between gastric secretion and motility.

**Hydrochloric Acid and Ferments.** There is some difference of opinion as to whether any parallelism exists in the variations in amount of hydrochloric acid and the gastric ferments in pathological conditions, and

<sup>1</sup> Archiv f. Verdauungskrankheiten, 1911, Band xvii, Heft 2, p. 119.

also as to the identity of lab and pepsin. P. Cohnheim,<sup>1</sup> after a study of the various methods of estimating the gastric ferments, states that the secretion of hydrochloric acid and the secretion of ferments do not rise and fall together. The secretion of the fasting stomach contains enormous amounts of ferment in comparison with its hydrochloric acid content. He believes that lab and pepsin are identical. He further concludes that with gastric contents containing free hydrochloric acid, the methods for the estimation of pepsin of Hammerschlag, Mett, Fuld, and Jacoby are equally serviceable and reliable; in gastric contents that have no free hydrochloric acid, the methods of Fuld and Jacoby are much less delicate than the others. With such contents Boas' lab test is the most reliable method.

**Gastric Ulcer.** ETIOLOGY OF GASTRIC ULCER. Discussing the essential causes of gastric ulcer, Moullin<sup>2</sup> starts with the postulate that only the mucosa of the stomach is protected from the effects of digestion by the gastric juice, and when any influence destroys the mucosa, the digestive action of the gastric juice produces an ulcer. Of the direct causes of ulcer thus produced, Moullin first mentions trauma, and cites several instances in which injury to the epigastrium has been immediately followed by hematemesis and later by the symptoms of chronic ulcer. The condition of the mucous membrane is an important factor in determining the influence that trauma may have in inducing gastric ulcer. When the mucous membrane is greatly congested as the result of digestive activity, the slightest degree of trauma is sufficient to produce permanent injury. It has even been suggested that the wearing of ill-fitting stays by women of the domestic class, who have constantly to be stooping at their work, may be one of the reasons why gastric ulcer is of such frequent occurrence among them. The second local cause Moullin mentions is the swallowing of corrosive poisons. Embolism is an important cause and one which Moullin thinks determines the frequency of ulcer after injuries or operations, especially those involving bones. He thinks, moreover, that embolism is probably the immediate cause of the ulcers occurring in the course of septic infections and intoxications. Thrombosis is a factor which acts the same as embolism. Moullin thinks also that the gastric and duodenal ulcers occasionally found after injury to the brain and spinal cord, and those which are caused experimentally by subphrenic section of the vagi and by injuries of the splanchnics and of the celiac plexus are also the result of local vascular lesions.

According to Moullin, all of the above mentioned causes of ulcer are exceptional, and, in fact, local causes of any description do little more than determine the location of the ulcer. The essential factor in

<sup>1</sup> Archiv f. Verdauungskrankheiten, 1910, Band xvi, Heft 6, p. 627.

<sup>2</sup> Lancet, 1910, No. 4544, p. 993.



ulcer is the morbid condition of the mucous membrane, of which the ulcer is little more than a local accentuation. "An ulcer may make all the symptoms worse and perpetuate them, but no matter how prominent it appears to be, it is not the primary element. The essential factor is the morbid condition of the mucous membrane. It is only when an ulcer refuses to heal and has become chronic that it can be regarded as a disease of itself."

The gastric mucosa, according to Moullin, "is swollen and congested to the utmost, especially in those parts where it is thickest, softest, and most vascular, and where the lymphatic follicles are largest and most numerous. It bleeds with the slightest touch, and the blood pours from it. Hemorrhages seem to break out everywhere in its substance. Its surface is so soft and tender that the slightest irritation causes it to give way. Erosions which, if circumstances are favorable, develop into ulcers, make their appearance wherever it is touched or squeezed by the powerful muscles that surround it, and when it becomes inflamed, as it always does around an ulcer or an abrasion, these consequences are carried farther still. The wonder in such cases is not that hemorrhages and ulcers occur, but that the stomach and duodenum are ever free from them."

It is this congested edematous condition of the mucous membrane which, according to Moullin, is frequently responsible for the hemorrhage, pain, and other symptoms even before actual ulceration has occurred.

The most important etiological factor in producing this state of the gastric mucosa Moullin claims to be septic poisoning. In the majority of instances he finds the source of this septic poisoning to be either the teeth or some portion of the buccal or nasopharyngeal cavities. Septic poisoning is, however, not the only cause. The same influence may be caused by any factor that leads to continued irritation, such as unsuitable food, overeating, irregularity of meals, and exposure to colds.

Though much of what Mr. Moullin says sounds rational, many of his statements are certainly not subject to proof by observation, experiment, or clinical experience. Crämer,<sup>1</sup> having somewhat the same view in mind concerning the pathological condition of the mucosa in cases of gastric ulcer, undertook to study, histologically, small portions of the stomach wall, removed at the time of operation from persons suffering with gastric ulcer. Of 7 cases that were free from complications and appropriate for study in this connection, 3 showed a practically normal mucosa, 3 the evidences of some degree of gastritis, and 1 atrophy of the secreting glands.

*Gastric Juice.* There has been great diversity of opinion as to just what role the gastric juice, and especially a hyperacid gastric juice,

<sup>1</sup> Archiv f. Verdauungskrankheiten, 1911, Band xvii, Heft 1, p. 1.

plays in the etiology of gastric ulcer. The most conservative opinion of today is that the gastric juice is of little, if any, importance in the production of an ulcer, but that when the ulcer is once formed, gastric juice, especially if it is hyperacid, is an important factor in preventing healing of the ulcer.

Bolton<sup>1</sup> concluded, from some experiments performed some time ago with his gastrototoxic serum, that the gastric juice is of more or less importance in the production of the ulcer. His conclusions at that time were:

1. That acute ulcer fails to appear if the gastric juice be put out of action, although the animal may die from the effects of the poison.

2. That the ulceration produced in the presence of hyperacid gastric juice is much more extensive than that produced in a stomach secreting juice of the normal acidity.

3. That the gastric juice is able to attack the gastric cells and produce an ulcer, although the cells are not actually killed by the poison. It is merely necessary to damage the cells to some extent.

4. That hydrochloric acid of the various strengths found in the condition of hyperacidity in the human subject is able to act as a poison for the gastric cells.

5. That acute gastric ulcer heals equally well whether the gastric juice be increased or diminished in acidity to the extent usually found in man, provided that the stomach empties itself in the normal time.

6. That acute ulcer is more easily produced in the digesting than in the resting stomach, and that in the former case it is much more extensive in character.

7. That undue retention of food in the stomach delays the healing of acute ulcer for at least twice the normal time, because the prolonged action of the gastric juice irritates the base of the ulcer, and may cause necrosis of the granulation tissue in the early stages, and excessive formation of fibrous tissue in the later stages. The growth of the new mucous membrane over the base of the ulcer is thus delayed, and there is produced more inflammatory thickening than usually occurs in the condition of normal healing.

*Diet.* Bolton has recently performed some further experiments, which confirm his former conclusions and to an extent enlarge upon them, especially concerning the influence that diet has upon the healing of an ulcer. The conclusions of his latest experiments are that:

1. The theory with regard to the part played by the gastric juice in the production of gastric ulcer receives further confirmation, because ulceration is the more rapidly produced in proportion as the gastric juice is allowed a longer period of contact with the wall of the stomach.

2. The epithelium grows over the base of an ulcer more rapidly when the animal is given a milk diet than when it is given a meat diet. In the

<sup>1</sup> British Medical Journal, 1910, No. 2608, p. 1963,

case of a milk diet, the base of a moderately sized ulcer is usually completely covered by the twentieth day, while in the case of a meat diet the same sized ulcer would in most cases be uncovered in the centre at that time.

3. Frequently, in the case of meat-fed animals, the ulcer is completely uncovered on the twentieth day, the granulation tissue of the base of the ulcer having become necrotic. Such an ulcer may be only one-fifth of the size of the original ulcer, owing to the contraction of the fibrous tissue in the base, although healing has only commenced at the edge.

**GASTRIC ULCER AND TUBERCULOSIS.** From time to time different observers have claimed a more or less intimate relationship to exist between tuberculosis and gastric ulcer. Arloing<sup>1</sup> believes that the vascular obliteration so often found in the neighborhood of ulcers is the cause rather than the result of the ulcer, and is itself produced by the toxins of a latent tuberculosis. More recently, Kodon<sup>2</sup> has expressed the view that the ultimate cause of gastric ulcer is latent tuberculosis. Neither of these observers present any very convincing data in support of their claims, which can be dismissed as improbable and unproved. Stiller<sup>3</sup> contends that there is a relationship between tuberculosis and gastric ulcer which consists in the fact that at the basis of both of them, in most cases, is an inherited constitutional weakness—Stiller's *asthenia universalis congenita*. There is no doubt that this condition, more commonly known as the *habitus asthenicus*, constitutionally predisposes to tuberculosis as well as to *hysteroneurasthenia* and the various functional gastric disorders. Stiller takes somewhat of a unique position in considering gastric ulcer also a consequence of the *habitus asthenicus*. If such is the case, Stiller is undoubtedly correct in assuming the relationship he claims to exist between tuberculosis and ulcer.

**SKIAGRAPY IN GASTRIC ULCER.** Skiagraphy as an aid to the diagnosis of gastric ulcer is purely a development of recent years. Within the last year numerous contributions have appeared attesting to the serviceability of this method of examination in certain types of gastric ulcer.

Adler<sup>4</sup> apparently believes that he is able to diagnosticate simple ulcer by the increased depth of shadow that the collection of bismuth makes in the ulcerated area. The majority of radiographers who have contributed to this subject, however, do not believe that it is possible to diagnosticate simple ulcer. They are, on the other hand, almost unanimous in their opinion that the chronic ulcer penetrating into neighboring organs is, in the vast majority of instances, subject to

<sup>1</sup> Des ulcérations tuberculeuses de l'estomac, Paris, 1903.

<sup>2</sup> Wiener med. Wochenschr., 1910, Nos. 34 and 35.

<sup>3</sup> Berliner klin. Wochenschr., 1911, No. 8, p. 325.

<sup>4</sup> Journal of the American Medical Association, 1910, vol. lv, No. 20, p. 1725.



radiographic demonstration, and that it is possible with almost equal frequency to diagnosticate by this means the chronic ulcer located on the lesser curvature, which shows some tendency to cicatrization. The former condition is recognized by the small, broad-based, circumscribed, sharply outlined bulging of the margin of the stomach; the cicatrizing ulcer located on the lesser curvature is recognized by the more or less definite contracture of the greater curvature of the stomach, producing some degree of hourglass stomach.

Faulhaber<sup>1</sup> calls attention to the not infrequent association of these two findings when a callous or penetrating ulcer is located on the lesser curvature. Other articles dealing with the radiographic diagnosis of gastric ulcer are those of Rieder,<sup>2</sup> Haudek,<sup>3</sup> Reiche,<sup>4</sup> and de Quervain.<sup>5</sup>

TREATMENT. Bolton,<sup>6</sup> on the basis of the results of the experimental observations mentioned above, makes the following recommendations concerning the treatment of gastric ulcer:

During the early stages of the healing of acute ulcer the patient should be given a food which does not stay long in the stomach, and which does not excite a copious flow of gastric juice.

The period of treatment in bed should be at least three weeks.

The starvation diet of the older physicians is not necessary, because the general nutrition suffers too much, and because ulcers heal well on some diet such as the above.

In the case of acute ulcers which are extending, or chronic ulcers, healing cannot be expected to occur in three weeks, because the ulcer must first be got into a suitable condition for healing; and then, owing to its size and thickness, the healing must take some weeks longer to be completed, so that the treatment in bed is to be conducted like that of simple acute ulcer, but extended over a period twice as long.

Since in many cases of gastric ulcer there is hyperacidity of the gastric juice, and when the gastric juice is acting destructively hyperacidity increases this destructive tendency, this high degree of acidity should be controlled by the administration of alkali. This is not so necessary in acute ulcer as in the more chronic forms, because the few estimations that have been made of the gastric secretion in acute ulcer show that it is not hyperacid.

In another article, Bolton<sup>7</sup> gives in some detail his treatment of gastric ulcer, which, however, contains no strikingly new recommendations.

<sup>1</sup> Münchener med. Wochenschr., 1910, No. 40, p. 2073.

<sup>2</sup> Ibid., No. 48, p. 2508.

<sup>3</sup> Ibid., 1911, No. 8, p. 399, and Münchener med. Wochenschr., 1910, No. 47, p. 2463.

<sup>4</sup> Ibid., 1911, No. 1, p. 30.

<sup>5</sup> Ibid., No. 17, p. 884.

<sup>6</sup> Loc. cit.

<sup>7</sup> British Medical Journal, 1910, No. 2591, p. 501.

*Atropine.* Schick<sup>1</sup> writes of the success that has been experienced in the Neusser clinic in Vienna with the atropine treatment of gastric ulcer that is so highly endorsed by v. Tabora. This treatment was described in some detail in PROGRESSIVE MEDICINE, December, 1909. Schick calls attention to the necessity, in selecting cases for the atropine treatment, of first testing the condition of the nervous system. In cases in which there are undoubted manifestations of irritability of the nervous system, one can without hesitation increase from a preliminary daily dose of  $\frac{1}{2}$  or  $\frac{3}{4}$  mg. rapidly to 1 or 2 mg. a day. If, however, there are no such manifestations of an irritable nervous system, increases in dosage should be made with the greatest caution. By observing these precautions, Schick has treated a large number of patients with atropine without ever having encountered maniacal outbreaks or other unpleasant phenomena.

Schick mentions another use to which atropine may be put to sometimes great advantage. This consists in its administration to differentiate between spastic and organic hourglass contraction of the stomach. In the spastic form the contraction disappears upon the administration of atropine.

*Serum.* Hort<sup>2</sup> gives in some detail his plan of treatment of gastric ulcer, the most noteworthy feature of which is the oral administration of normal serum, which may be from man, sheep, horse, or ox. The value that Hort claims in this element of his treatment depends upon its direct and indirect action. Its indirect action is dependent upon the antiferments that all serums possess. As Hort believes ulcer to be due to the digestive action of the gastric ferments, the administration of an agent possessing antifermentative properties should, according to his views, be of undoubted value. The direct action of the serum depends upon its healthful stimulating effect upon an ulcer.

The ever-active discussion of *medical versus surgical treatment* in gastric ulcer continues, and a number of worthy articles have been contributed to the subject during the last year. Kuttner<sup>3</sup> manifests an extremely conservative attitude, and believes that an uncomplicated case of gastric ulcer becomes surgical only when it has resisted several well-conducted courses of some recognized form of medical treatment. He emphasizes the difficulty of deciding upon the proper course of treatment on account of the great difficulty of justly weighing the advantages and the disadvantages of the surgical and medical treatment. This is partly due to the lack of standard of diagnosis and cure. On this account most of the statistics are of little value in deciding upon the best mode of treatment. A factor which would be of great moment in

<sup>1</sup> Wiener klin. Wochenschr., 1910, No. 34, p. 1229.

<sup>2</sup> British Medical Journal, 1910, No. 2607, p. 1903.

<sup>3</sup> Berliner klin. Wochenschr., 1911, No. 21, p. 925.

deciding upon the values of the different forms of treatment is the frequency of development of carcinoma from ulcer. The surgeons claim that as many as 70 per cent. of their cancer cases are secondary to ulcer. The medical men can obtain a history of previous ulcer in less than 5 per cent. of their cases. It is difficult to reconcile such extraordinary differences and certainly impossible to accept them both as statistics upon which to base opinions of treatment. Lockwood<sup>1</sup> takes very much the same attitude as does Kuttner. Hall<sup>2</sup> believes somewhat more in the value of early surgical treatment. In his opinion the advantages of medical treatment may be expressed in (1) the avoidance of immediate operative and anesthetic dangers, and (2) in the avoidance of possible vicious circle, recurrence of jejunal ulcer, ventral hernia, and postoperative adhesions. Against these advantages, however, he notes the following dangers:

Likelihood of failure of medical treatment.

At least an even chance that the patient will relapse if temporarily cured.

Danger of development of pyloric stenosis through the presence of an active ulcer at that point, or spasm caused by its irritation or cicatricial stenosis following its healing.

Danger of hemorrhage or acute perforation.

Danger of the development of cancer on the base of the ulcer.

Danger of adhesions which cripple the action of the stomach, obstruct the gall passages, produce serious pain, and often require late operation.

Danger from a troop of late complications of slowly developing perforation, among which are peritonitis, subphrenic abscess, empyema, pyopneumothorax, pneumonia, perforation through the lung, septic pericarditis, mediastinitis, pancreatitis, suppurative processes about the liver and gall-ducts, and general sepsis.

The development of such a condition of anemia and malnutrition from the crippling of the digestive apparatus as to lead to neurasthenia, hysteria, and various functional nervous diseases, or to pave the way for an easy and often fatal infection by the tubercle bacillus, pneumococcus, or influenza bacillus.

**Tests for Gastric Carcinoma.** TRYPTOPHAN TEST. The most important articles which have appeared during the past year upon cancer of the stomach are those which concern the tryptophan test of Neubauer and Fischer, which was described in *PROGRESSIVE MEDICINE* for December, 1910. To date I have seen eight articles on the subject; four of them, including one by Neubauer and Fischer themselves, were more or less favorable to the test, whereas the remaining four were unfavorable. The articles which are favorably inclined to the test are those of Walker

<sup>1</sup> Journal of the American Medical Association, 1911, vol. lvi, No. 13, p. 948.

<sup>2</sup> *Ibid.*, No. 2, p. 85.



and Williamson,<sup>1</sup> Weinstein,<sup>2</sup> Oppenheimer,<sup>3</sup> and Neubauer and Fischer.<sup>4</sup> Those denying any diagnostic significance to the test are the articles of Kuttner and Pulvermacher,<sup>5</sup> Ehrenberg,<sup>6</sup> Ley,<sup>7</sup> and Pechstein.<sup>8</sup>

Neubauer and Fischer, combining the results obtained by Ley, Lyle and Kober, Oppenheimer, and Pechstein, find that of 26 cases of certain carcinoma of the stomach, 22 (84 per cent.) gave a positive reaction; of 12 cases of clinical carcinoma of the stomach, not verified by operation or autopsy, 9 (75 per cent.) gave a positive reaction; of 26 cases suggestive of carcinoma, 6 (23 per cent.) reacted positively; of 42 cases of other gastric disease than carcinoma, 5 (12 per cent.) gave a positive reaction; 5 cases of apparently normal stomachs all gave negative reactions.

Weinstein modifies the test by leaving out the glycyl-tryptophan entirely. He claims that the enzyme secreted by the cancer is potent enough to hydrolyze protein as well as dipeptid into amino acids. Performing both the original test and his modification in a series of cases, he found that in only two or three instances was the test positive after the administration of glycyl-tryptophan and negative when no glycyl-tryptophan was administered. Weinstein thinks that the exclusion of glycyl-tryptophan is of advantage because of the fact that the glycyl-tryptophan is costly and the toluolized samples form opaque, milky mixtures with the stomach contents that frequently obscure the reaction. He believes, furthermore, that the glycyl-tryptophan may undergo spontaneous decomposition with the liberation of tryptophan, thus destroying the value of the reaction. An undoubted objection to Weinstein's recommendation of the exclusion of glycyl-tryptophan is that if the cancer enzyme is able to split proteid into amino-acids, there is no assurance that in the fasting stomach or in the ordinary test breakfast there is sufficient proteid to permit the action of the enzymes with the liberation of tryptophan. This objection, however, is overcome if Weinstein's suggestion of using a test meal instead of a test breakfast is followed.

Weinstein contends that it is not necessary to test the stomach contents for the presence of occult blood before applying the glycyl-tryptophan test, for he says that blood in sufficient quantity to split the glycyl-tryptophan would be recognized by the naked eye. Subsequently he made the observation that pepper, as well as lemon juice, interferes with the tryptophan reaction; that sugar is an excellent

<sup>1</sup> Lancet, 1911, No. 4568, p. 731.

<sup>2</sup> Journal of the American Medical Association, 1910, vol. lv, No. 13, p. 1085.

<sup>3</sup> Deutsches Archiv f. klin. Med., 1910, Band ci, Heft 3 and 4, p. 293.

<sup>4</sup> Münchener med. Wochenschr., 1911, No. 13, p. 674.

<sup>5</sup> Berliner klin. Wochenschr., 1910, No. 45, p. 2057.

<sup>6</sup> Ibid., 1911, No. 16, p. 704.

<sup>7</sup> Ibid., No. 3, p. 119.

<sup>8</sup> Ibid., No. 9, p. 375.

stimulant to the secretion of cancer enzyme, and that beef is better than chicken.

He suggests as a good meal for the tryptophan test, bread and butter, with meat prepared very plainly, without extra seasoning or dressing, and some very sweet, weak tea.

Weinstein's results are not included in the above compilation by Neubauer and Fischer, but they are favorable to the test. The results obtained by the other four observers, however, and their consequent opinions upon the serviceability and reliability of the test were by no means so favorable. Kuttner and Pulvermacher modified the test somewhat, so that their results may be open to some criticism. On account of the expense of glycyl-tryptophan, they substituted for it "seidenpepton." They performed a number of control tests with both glycyl-tryptophan and seidenpepton and obtained similar results in all of them. The *seidenpepton test* is performed as follows: To 5 c.c. of the filtered gastric juice is added 5 c.c. of a soda-chloroform solution, made up of 5 gm. of sodium carbonate and 25 gm. of chloroform to a liter of water. If the gastric juice is highly acid, a drop of sodium hydroxide should be added. To this mixture is then added 2 c.c. of a 20 per cent. watery solution of seidenpepton. This is then placed in the incubator for twenty-four hours, then boiled and filtered; the filtrate is acidulated with a drop of acetic acid and then evaporated to 1 c.c. on a water-bath, and finally placed in iced water for several hours. In positive cases, this latter procedure results in the formation of characteristic crystals. With this method, Kuttner and Pulvermacher performed 163 tests on 92 different individuals, some with apparently normal stomachs, others presenting various gastric disorders. They had positive results in normal individuals as well as in those with gastric diseases, and negative results in patients with carcinoma of the stomach as well as in those with other gastric diseases or normal stomachs. They consequently conclude that the test is of no significance either for or against the diagnosis of gastric carcinoma. Though these conclusions apply to the seidenpepton test used by Kuttner and Pulvermacher, they can hardly with justice be claimed to apply equally as well to the glycyl-tryptophan test.

However, Ehrenberg, Pechstein, and Ley used the test exactly according to the instructions of the originators. Ehrenberg had quite as variable results with the glycyl-tryptophan as did Kuttner and Pulvermacher with the seidenpepton. Of 9 cases of carcinoma of the stomach, he had a positive reaction in 4 cases, a negative reaction in 4 cases, and in the remaining case, once a negative and once a positive reaction. Ehrenberg's results cannot be open to the possible criticism of being influenced by the presence of pancreatic juice, for in all instances in which there was the slightest suspicion of the presence of bile the Gmelin test was performed. In this connection it is interesting to

note that Ehrenberg observed, as did Kuttner and Pulvermacher, that a yellow or green color of the gastric juice was not always due to biliary coloring matters. A very interesting observation made by Ehrenberg and also by Peehstein is that the result of the test is often dependent upon the reaction of the gastric juice. In practically all cases in which a positive reaction was obtained, the gastric juice was either neutral or very slightly acid, and in practically all the cases of carcinoma of the stomach in which a negative reaction was obtained, the gastric juice was distinctly or highly acid. Ehrenberg even found that he could, in many cases, convert a negative into a positive or a positive into a negative reaction by adding acid or alkali.

It is impossible as yet to draw any conclusions of the serviceability and reliability of the test. I think one can safely say that the test will certainly not prove to be an absolutely diagnostic one of carcinoma of the stomach, but it is barely possible that further investigation may prove it to be of some significance in the diagnosis.

**NEW TEST.** Oppenheimer,<sup>1</sup> in his article on the glycyl-tryptophan test, proposes a new test for carcinoma of the stomach, performed as follows: To several c.c. of filtered gastric juice, obtained after administration of an ordinary test breakfast, is carefully added, drop by drop, a 3 per cent. solution of acetic acid. A positive reaction is indicated by a cloudiness which disappears on the addition of an excess of acetic acid or a small amount of hydrochloric acid, but does not disappear upon dilution with water. The only source of error to be considered is in the presence of mucus, which also gives a cloudiness with acetic acid; this, however, does not disappear upon the addition of hydrochloric acid, but does disappear upon dilution with water. Only when the gastric juice is so cloudy that it does not become clear upon the addition of an equal quantity of distilled water is it impossible to use the test. Oppenheimer used this test in all of the cases in which he used the glycyl-tryptophan test, and obtained similar results in all cases with the two methods.

**ESTIMATION OF DISSOLVED ALBUMIN.** A method somewhat analogous in nature to the Salomon test is the one employed by Wolff and Jung-hans<sup>2</sup> for the quantitative estimation of dissolved albumin in the gastric contents. Their method is as follows: Filtered gastric contents obtained by removal one hour after administration of a test breakfast is placed in small test-tubes and diluted with distilled water in the proportions of 1 to 10, 0.5 to 10, 0.25 to 10, 0.1 to 10, 0.05 to 10, and 0.025 to 10. On top of the diluted gastric juice in each of these tubes is then floated 1 c.c. of a reagent prepared as follows:

Phosphotungstic acid . . . . .	0.3 gm.
Concentrated hydrochloric acid . . . . .	1.0 gm.
Alcohol (96 per cent.) . . . . .	20 c.c.
Distilled water . . . . .	ad 200 c.c.

<sup>1</sup> Loc. cit.

<sup>2</sup> Berliner klin. Wochenschr., 1911, No. 22, p. 978.



The amount of dissolved albumin is expressed by the degree of dilution in the first tube in which no cloudy ring occurs at the line of junction of the two liquids. For the dilutions expressed above the corresponding amounts of albumin would be expressed as 10, 20, 40, 100, 200, and 400.

Though Wolff and Junghans used their method in a large variety of gastric diseases, their only significant results were obtained in 8 cases of carcinoma of the stomach. In 6 of these, an albumin index of 400 was obtained; in the remaining 2, of 200. In all of these cases, they found also very low pepsin and hydrochloric acid values. They think this combination of high albumin index with low pepsin and hydrochloric acid values is especially significant of carcinoma of the stomach. Undoubtedly the same criticism may be raised against this test as applies to the Salomon test, namely, that it is obtained in the majority of instances only after more or less extensive ulceration of the tumor has occurred, and is consequently of little service in establishing a diagnosis sufficiently early to permit of a radical surgical cure.

**GRAFE-RÖHMER HEMOLYTIC TEST.** Apparently but little attention is now paid to the Grafe-Röhmer hemolytic test. But two articles upon it have appeared during the past year, one by Grafe,<sup>1</sup> the other by Grafe and Röhmer.<sup>2</sup> The originators of the test still claim for it considerable diagnostic value, though they admit the existence of so many factors that interfere with the test and so many qualifications that alter the interpretation of the results that little significance can be attached to it. I can see no reason to alter the opinion expressed in *PROGRESSIVE MEDICINE* last year, based upon the several articles that had appeared dealing with the test.

**TINCTURE OF CINCHONA TEST.** Mironescu<sup>3</sup> proposes a test that he has often found serviceable in the differential diagnosis of carcinoma of the stomach from other conditions associated with the absence of hydrochloric acid. It consists merely in the administration of 20 drops of tincture of cinchona before a test breakfast. Mironescu has found that in the gastric disorders other than carcinoma, characterized by an absence of hydrochloric acid, and especially in the functional disorders, when a test breakfast is preceded by the tincture of cinchona, hydrochloric acid appears in greater or less quantity. The same, however, does not occur when the anacidity is due to carcinoma.

**PEPSIN IN URINE.** The experiments of Wilenko on the excretion of pepsin in the urine were mentioned in *PROGRESSIVE MEDICINE* for 1908. Similar investigations have recently been made by Takeda<sup>4</sup> and Bieling.<sup>5</sup> Takeda's results substantiate those of Wilenko in so far as they

<sup>1</sup> Münchener med. Wochenschr., 1910, No. 38, p. 1977.

<sup>2</sup> Deutsches Archiv f. klin. Med., 1910, Band c, Heft 5 and 6.

<sup>3</sup> Internat. Beiträge z. Path. u. Therap. d. Ernährungsstörungen, 1911, Band ii, Heft 4, p. 502.

<sup>4</sup> Deutsche med. Wochenschr., 1910, No. 39, p. 1807.

<sup>5</sup> Deutsches Archiv f. klin. Med., 1911, Band cii, Heft 5 and 6, p. 507.

show that pepsin may be excreted in the urine in cases in which none is present in the gastric juice. He found, further, that there is a certain relationship between the extent of involvement by carcinoma and the amount of pepsin excreted in the urine, in so far as in cases of great involvement by cancer little or no pepsin is found in the urine. His observations suggested, moreover, that the disappearance of pepsin from the urine occurred rather earlier in cases of carcinoma of the pylorus than of other parts of the stomach. He concludes that, other things being equal, the absence of pepsin in the urine speaks more for carcinoma of the stomach than for a simple anacidity. No great diagnostic significance, however, can be attached to the test, and it seems to be of no help whatever in the early diagnosis of carcinoma. Takeda found the edestin method the best for the estimation of pepsin in the urine, and thinks that only the twenty-four-hour urine should be used.

Bieling found merely that the pepsin excretion in the urine is greatly reduced or entirely absent in cases of extensive involvement of the stomach by carcinoma, but that this is of no significance in the early diagnosis.

**Skiagraphy in Gastric Carcinoma.** The assistance that skiagraphy may render in the diagnosis of carcinoma of the stomach is considered by Haudek<sup>1</sup> and Faulhaber.<sup>2</sup> The changes that characterize the skiagraphic picture in carcinoma of the stomach are in the case of a vegetative carcinoma, irregular prominences projecting into the lumen of the stomach without, however, materially altering the size of the organ itself; in the case of infiltrating carcinoma, the most characteristic feature is a distinct decrease in the size of the stomach.

In regard to the significance of skiagraphic examinations in the diagnosis of carcinoma of the stomach, Faulhaber says that it is not possible by this means to arrive at an early diagnosis. However, when the diagnosis can be made clinically it can also be made by skiagraphic examination. Moreover, in about 30 per cent. of the cases in which it is impossible to make a definite clinical diagnosis on account of the absence of a palpable tumor, it can be definitely made by the aid of skiagraphy. In addition, the skiagraph may give valuable information as to the location and extent of the tumor. Thus, some degree of estimation of the operability of the tumor may be obtained. Faulhaber believes, furthermore, that skiagraphy may, in certain cases, aid in the exclusion of carcinoma.

**Early Treatment in Carcinoma.** Two articles pleading for the early recognition and institution of appropriate surgical measures in carcinoma of the stomach appear respectively from the pens of Sherren<sup>3</sup>

<sup>1</sup> Münchener med. Wochenschr., 1911, No. 8, p. 399.

<sup>2</sup> Deutsches Archiv f. klin. Med., 1910, Band ci, Heft 1 and 2, p. 177.

<sup>3</sup> British Medical Journal, 1911, No. 2634, p. 1457.

and Pochhammer.<sup>1</sup> Sherren classifies carcinoma of the stomach into that of the body, that of the pylorus, and that of the cardia. He dismisses carcinoma of the cardia and of the pylorus with the remark that in these locations the lesions give rise to signs of obstruction which permit of an early diagnosis. Carcinoma of the body of the stomach he classifies as that following previous gastric disease, that occurring in individuals with a previously "clean" gastric history, and that which is entirely latent. The latent form he does not discuss, as the cases of this type are too far advanced to consider radical treatment before the disease can be recognized. The form which occurs in individuals who have previously had no gastric symptoms is an extremely important class, and Sherren believes that all individuals who, in adult or advanced life, for the first time complain of gastric symptoms should be looked upon as extremely suspicious of being early cases of carcinoma of the stomach. In the group following previous gastric disease are included especially those cases which develop on gastric ulcer. He believes that carcinoma can be prevented in many of these cases by appropriate operation for the ulcer.

Pochhammer demonstrates a number of cases to prove the remarkable results that can be attained by an early diagnosis and radical surgical treatment in carcinoma of the stomach. He pleads vigorously for a more thorough consideration of the possibilities of cure by operation in all patients in whom there can be any reasonable suspicion of the existence of carcinoma. He believes further, that unless the disorder can be proved without delay to be or not to be carcinoma, an exploratory laparotomy should be performed.

**Disturbances of Gastric Secretion.**—An excellent article on the diagnosis and treatment of the disturbances of secretion of the stomach is contributed by v. Tabora.<sup>2</sup> He divides these into the irritative and the depressive. In the first group come hyperacidity and hypersecretion; in the second come hypochylia and achylia. (The latter two might be better expressed as hypoacidity and anacidity.) Hypersecretion may be continuous, alimentary, or intermittent. In the continuous form, which is sometimes known as Reichmann's disease, there is a large amount of secretion into the stomach, even when no food has been taken into it. Consequently, in the mornings large amounts of watery secretion may be vomited or removed by means of a stomach tube. In the alimentary form, an excessive gastric secretion is found only after food has been taken into the stomach. In the intermittent form, the patient has periods characterized by an abnormally large amount of secretion, but in the intervals the gastric functions are normal.

The symptoms of hypersecretion and hyperacidity may be very much

<sup>1</sup> *Berliner klin. Wochenschr.*, 1911, No. 12, p. 513.

<sup>2</sup> *Deutsche med. Wochenschr.*, 1911, No. 6, p. 241.



alike, and the differential diagnosis is made primarily upon the results of the test breakfast. In hyperacidity the amount of gastric contents removed is seldom above normal, and occasionally less than normal. When this is allowed to sediment, the solid portion is found to be not less than approximately half of the total amount. Furthermore, the difference between the total acidity and the free hydrochloric acid is seldom less than 15 or 20. In hypersecretion (we are speaking now especially of the alimentary form), the total amount of contents removed is usually greater than normal, and after sedimentation the solid portion is found to constitute but a small fraction of the total, never as much as half; the total acidity is seldom as high as it is in hyperacidity, and the difference between the total acidity and the free hydrochloric acid is always slight.

In discussing the treatment of both the irritative and depressive forms of disturbances of gastric secretion, v. Tabora warns against the error of instituting treatment in cases in which an abnormality of secretion is found purely by chance, and in which there are no symptoms referable to the secretory disturbance. The treatment of hyperacidity consists in the administration of remedies to control the amount of secretion of acid and to relieve the symptoms of an excessive amount of acid already secreted. Most serviceable in controlling the amount of secretion, v. Tabora finds atropine, which he administers hypodermically in doses of from 0.5 to 1 mg. two or three times daily, and alkalies administered about one-half hour before each meal. His favorite alkaline mixture consists of four parts of *magnesia usta*, two parts of sodium citrate, and one part of sodium or magnesium sulphate; of this mixture, as much as would be held on the point of a knife is administered as a dose. For the control of symptoms referable to the hyperacidity, the same mixture is employed as soon after a meal as symptoms occur. The diet that v. Tabora recommends is a mixed one, composed, however, chiefly of proteids. Theoretically a large amount of fat in the diet should prove serviceable; practically it is found to be poorly borne. The treatment of hypersecretion consists, in the milder cases, of restriction to a diet rich in proteid and fat, and in the administration of alkalies. In the severer cases the atropine treatment should also be employed. Occasionally, especially in the continuous form of hypersecretion, lavage is indicated.

Treatment of the depressive disturbances of secretion consists in the administration of an appropriate diet and large doses of hydrochloric acid. v. Tabora seldom orders less than 100 drops of dilute hydrochloric acid in a day; this is administered in five portions, half of each one of which is taken with the meal, the other half immediately after the meal. Meals should be administered in small quantities and frequently, and though mixed, should consist principally of carbohydrates.

Friedenwald<sup>1</sup> presents the results of his observations on 14 cases of alimentary hypersecretion. Of the 14 cases, 12 occurred in males, 2 in females. The ages of the patients varied between eighteen and sixty-four years. A prominent symptom in all of his cases was a marked loss of weight, this loss ranging from 15 to 32 pounds. The quantity of gastric contents removed after an Ewald-Boas test breakfast varied between 190 and 410 c.c. After a dry test breakfast, consisting of ordinary soda crackers, the amount of gastric contents extracted varied between 104 and 220 c.c. In none of the cases could more than 10 to 15 c.c. of secretion be removed from the fasting stomach.

**Influence of Perigastric Lesions on Gastric Secretion.** It is a matter of common observation that diseases of other abdominal organs than the stomach are frequently accompanied by gastric hyperacidity. Lichty<sup>2</sup> performed a series of experiments on dogs with the intention of experimentally duplicating this influence of perigastric lesions upon gastric secretion. Dogs were given test meals until a fairly representative average of the gastric secretion was obtained. They were then operated upon and the gall-bladder filled with cinders and pebbles. After this, more gastric analyses were made, when the animal was again operated upon and the appendix filled with foreign bodies which were fixed in place with sutures. Gastric analyses were again made. Lichty records the results of his experiments in but 3 of the dogs; in 2 of them there was an increase in the gastric acidity after the operations of respectively 25 and 30 per cent.; in the third, there was a diminution in the total acidity of 40 per cent.

**The Stomach in Acute Infections.** Gastric symptoms of a more or less severe nature are an almost constant associate of the acute infections. They have usually been interpreted as a purely functional derangement. Jerusalem,<sup>3</sup> however, studying histologically the stomachs from patients dying with acute infections, concludes that all of the acute infections, excepting whooping cough, are accompanied by profound histological changes in the stomach. In the vast majority of instances, these changes are in the nature of an interstitial gastritis with proliferation of the interstitial connective tissue.

**Gastric Analysis in Diabetes.** Gilbride<sup>4</sup> studied the acidity and peptic digestion of the gastric juice of a number of diabetics, and found the secretion of pepsin to be frequently reduced and sometimes absent. He found further that there was no constant relationship between the secretion of acid and pepsin. The results are open to the criticism that the Mett test, which was used, is not a reliable indicator of the amount of pepsin present in a specimen of gastric juice. It may not be out of

<sup>1</sup> American Journal of the Medical Sciences, 1910, No. 462, p. 318.

<sup>2</sup> Journal of the American Medical Association, 1910, vol. lv, No. 21, p. 1799.

<sup>3</sup> Deutsches Archiv f. klin. Med., 1910, Band ci, Heft 3 and 4, p. 283.

<sup>4</sup> Journal of the American Medical Association, 1911, vol. lvi, No. 7, p. 497.

place to remark here that when there is any gastric disturbance in association with diabetes, its symptomatic treatment frequently proves to be of the greatest benefit to the patient's general condition. I have, in several instances, seen lavage and the administration of large doses of hydrochloric acid, to a diabetic with motor insufficiency of the stomach and hypoacidity, result in a decided gain in weight and a gratifying improvement in the general condition.

**Gastric Mucosa in Chronic Disease.** In a comparative study of the gastric functions and the histology of the gastric mucosa in chronic gastric disease, Schmidt<sup>1</sup> found, as has frequently before been observed, that atrophy of the gastric mucosa could not account for the absence of hydrochloric acid in the gastric secretion. He found, however, that in many cases there was an extensive transformation of the gastric epithelium into the type of epithelium of the intestines. Though he finds this phenomenon most common in association with carcinoma, it occurs also in ulcer of the stomach. This epithelium functionates both as to secretion and absorption as does the normal intestinal epithelium. As the secretion of the intestinal epithelium is capable of splitting glycyl-tryptophan, he thinks that this metaplasia which he has observed is of significance in connection with the tryptophan test.

**New Gastric Syndrome.** Robin<sup>2</sup> writes upon what he calls a little known gastric syndrome and its diagnostic significance. This syndrome was first described by Reichmann in 1898, and consists, according to his description, of three cardinal symptoms—a pain in the stomach region, as though the stomach were being twisted, nausea, and regurgitation of watery fluid. Robin found this syndrome to be present in approximately 1 per cent. of all patients presenting themselves for treatment for some abdominal disorder. He finds, however, that the cases can be divided into three categories, depending upon the taste of the regurgitated fluid: (a) Those with the typical syndrome, in which there is regurgitation of a salty fluid; (b) those with regurgitation of a sour fluid; (c) those characterized by a vigorous flow of saliva instead of regurgitation. In about 95 per cent. of the cases in which there is regurgitation of a salty fluid, Robin finds a decreased secretion of hydrochloric acid or even a total anacidity; in the remaining 5 per cent. there is normal acidity. In 6.5 per cent. of the cases with regurgitation of salty fluid, carcinoma of the stomach existed. In the cases with regurgitation of a sour liquid, there was either normal acidity or hyperacidity. In those with a flow of saliva, there was either increased gastric secretion or hyperacidity.

The pain, which is a constant symptom, according to Robin, is described by some patients as extremely severe, by others as of lesser

<sup>1</sup> Mitteilungen aus den Grenzgebieten d. Med. u. Chir., 1910, Band xxii, Heft 3.

<sup>2</sup> Internat. Bieträge z. Path. u. Therap., 1911, Band ii, Heft 4, p. 489.



severity; it is sometimes expressed as a pressure, or, more frequently, as feeling like a twisting. It is usually located in the pit of the stomach, though occasionally more in the neighborhood of the umbilicus. The duration of the pain is from a few minutes to twenty or even thirty minutes. The treatment is the same as would be employed for the secretory derangement which is found associated with the syndrome in any particular case.

There is no doubt that most clinicians have seen cases conforming to one or the other of these types described by Robin. Since, however, they can be interpreted only as symptoms of numerous gastric disturbances, and since they are not characterized by any particular pathological picture, I can see no purpose in calling attention to them as syndromes worthy of any particular attention as such. The diagnosis of the condition responsible for the syndrome can be made only by careful study, including the administration of a test meal, and surely no clinician in attempting to diagnose a case presenting such symptoms as those described, would fail to make such study.

**Gastric Fever.** The diagnosis of gastric fever is probably one which very few men would care to make at the present day. For our forefathers the term probably meant a great deal, but it was undoubtedly used to cover a large number of conditions which the advances made in diagnostic technique have shown to be independent diseases. There is, however, a disease picture found especially in some of the rural districts of Germany, which seems to be better described by this term than by any other. The condition is described by Schleglmann<sup>1</sup> as being accompanied occasionally by a prodromal period of a few days, characterized by a slight headache, sense of chilliness, and loss of appetite. Usually, however, there is no prodrome, the patient being suddenly stricken with high fever, agonizing frontal headache, total loss of appetite, and more or less obstinate vomiting. The fever, which rises to 104° or 105°, is frequently accompanied by mild delirium. These symptoms last but for three or four days, when the convalescence commences, lasting, usually, several weeks. Investigation of the stools and urine of the afflicted has not revealed anything suggestive of the etiology of the disease. Schleglmann, however, noting that almost the only persons affected are those working in the hay fields in July and August, and that the disease is especially common when black rust or similar parasitic diseases have attacked the hay, believes that the cause of the disease is to be found in the latter agents. Before the condition can be looked upon as a clinical entity, it, of course, needs much exhaustive investigation of both its symptomatology and its pathogenesis.

<sup>1</sup> Münchener med. Wochenschr., 1911, No. 6, p. 299,

**Syphilis of the Stomach.** Siegheim<sup>1</sup> describes four lesions by which syphilis of the stomach may manifest itself—(1) gastric ulcer, (2) gummatous tumor, (3) pyloric stenosis, and (4) diffuse cellular infiltration and fibrous induration. The syphilitic ulcer may result from the breaking down of a gumma, or may result from simple syphilitic endarteritis, and then resembles a simple round ulcer. The gumma may be single or, as is more frequently the case, multiple. They occur in various parts of the stomach. According to Payr, two forms of syphilitic pyloric stenosis occur—(1) that resulting from the fibrosis of specific ulcers about the pylorus; (2) a simple decrease in the size of the lumen from gummatous infiltration. The first of these two forms of pyloric stenosis is permanent and subject to improvement only by surgical means; the second is subject to medicinal treatment.

A case, belonging, apparently, to the fourth type described by Siegheim, is reported by Hausmann<sup>2</sup> as having been cured by an injection of *salvarsan*.

**Chronic Gastritis.** In an article entitled "Absence of Hydrochloric Acid with Blood in the Stomach Secretion as a Symptom of Chronic Gastritis," Pilcher<sup>3</sup> presents the results of a large series of analyses undertaken in the Mayos' clinic. From the statistics and the arguments presented, it is impossible to judge very satisfactorily of the frequency or the significance of the condition.

**Gastric Inflation.** The only two methods which have been found to possess any practical value for inflating the stomach are that of directly pumping air into it by means of a stomach tube and a rubber bulb, and that of introducing, one after the other, sodium bicarbonate and tartaric acid. The latter method possesses the advantages of ease of administration, and the absence of the vomiting and gagging that frequently accompany the other method. It, however, possesses the great disadvantage of occasionally causing gastric hemorrhage in cases of ulcer or carcinoma, and also of producing alarming symptoms of collapse. In fact, there are on record at least several instances of death caused by this procedure. For these reasons the method of inflation by means of a rubber bulb is, in general, preferable. Aside from the safety of the procedure, it possesses the advantage of permitting various degrees of inflation according to the size of the stomach. One of its greatest disadvantages is that it frequently produces gagging and vomiting, and frequently portions of the vomited material are thus forced into the bulb. To overcome this disadvantage, Bardachzi<sup>4</sup> and Bauermeister<sup>5</sup> suggest that a glass receptacle be placed between

<sup>1</sup> Deutsche med. Wochenschr., 1911, No. 4, p. 148.

<sup>2</sup> Münchener med. Wochenschr., 1911, No. 10, p. 511.

<sup>3</sup> Journal of the American Medical Association, 1910, vol. lv, No. 21, p. 1790.

<sup>4</sup> Münchener med. Wochenschr., 1911, No. 12, p. 620.

<sup>5</sup> Ibid., No. 22, p. 1195.

the bulb and the stomach tube. If the tube leading from the bulb and the stomach tube both enter the glass receptacle (an ordinary large-mouthed bottle with perforated cork and glass tubing will answer) in its upper portion, any material vomited through the tube will remain in the bottom of the receptacle and not interfere with the completion of the inflation.

**Pyloric Stenosis.** The symptoms resulting from benign stenosis of the pylorus are primarily dependent upon the balance between the degree of obstruction at the pylorus and the propulsive powers of the stomach wall. At first, in practically all cases of pyloric stenosis the propulsive powers of the stomach increase sufficiently to overcome the resistance offered by the contracted pyloric lumen, and thus at the beginning only slight, if any, symptoms of gastric motor disturbance present themselves. As time passes, however, the propulsive powers of the stomach no longer find themselves equal to the demands put upon them, and symptoms of gastromotor insufficiency put in their appearance. This earliest stage in which such symptoms first definitely present themselves is designated by Jonas<sup>1</sup> as the exhaustion stage of pyloric stenosis. It is usually first characterized clinically by the occurrence of vomiting of material containing the residue of food eaten the previous day and by the presence of *sarcinæ*.

The stage of exhaustion is characterized further by sufficiency of the gastric musculature when it is only slightly taxed, and its inability to fulfil the demands upon it when these are made greater; consequently, when a Rieder test meal is administered, there appears in the radiograph a stomach which is little if any distended, and which is able to propel its contents into the duodenum in little, if any, more than the normal period; on the other hand, if an ordinary meal is eaten, the clinical manifestations of gastromotor insufficiency are present in the vomiting, such as was described above. The greater the weakening of the gastric musculature, the more does the radiograph after a Rieder meal approach in character that of uncompensated stenosis. The therapeutic indication when signs of failing compensation appear is for operative interference. However, if for any reason this cannot be accomplished, considerable improvement can often be effected by careful regulation of diet combined with lavage and the administration of oil.

Mackey<sup>2</sup> reports in great detail a case of *congenital spastic hypertrophy of the pylorus*, and Scudder<sup>3</sup> reports 3 operative cases and reviews the general diagnostic and operative features of the condition.

**PYLORIC STENOSIS AND GASTRIC ULCER.** There has been great difference of opinion as to the significance of disturbances of motility in gastric ulcer. Some observers claim that in all cases of gastric ulcer

<sup>1</sup> Wiener klin. Wochenschr., 1910, No. 31, p. 1135.

<sup>2</sup> Lancet, 1910, No. 4537, p. 458.

<sup>3</sup> Boston Medical and Surgical Journal, 1910, vol. clxiii, No. 11, p. 434.



in which motor insufficiency can be diagnosticated, a beginning, benign, organic stenosis must exist. Others claim that temporary food retention may result from pyloric spasm induced by the ulcer. Jonas<sup>1</sup> presents a case which seems beyond the question of a doubt to be one of gastric ulcer with intermittent pyloric spasm. He mentions the following points as of service in differentiating between a spastic and an organic pyloric stenosis: (1) The intermittent or permanent character of the food stagnation; alternations between a high degree of stagnation and normal motility speak for a spastic stenosis. (2) The presence of gastric dilatation; a high degree of stagnation with the absence of dilatation and increased peristalsis points to a spastic stenosis. (3) The result of treatment; permanent disappearance of the motor disturbance after a course of ulcer diet points to a spastic stenosis; in the case of organic stenosis symptoms of motor insufficiency soon reappear.

**PYLORUS DILATOR.** Einhorn<sup>2</sup> describes in some detail the use of his pylorus dilator. This instrument consists of a collapsible rubber bulb on the end of a long rubber tube, to the other end of which is attached a small hand pump. When the instrument is to be used, all of the air is extracted so that the rubber bulb becomes of the smallest possible size. The bulb and lower end of the tube are placed in lukewarm water and the bulb is then inserted into the patient's pharynx. The patient is given water to drink and the bulb thus arrives in the stomach. Here it remains for several hours, or if, as is better, the bulb is introduced at bedtime, it remains in the stomach over night. The dilatation then takes place the following morning. Before this occurs, however, it is necessary to determine if the dilator is in the duodenum. The tube should at this time be in up to the point marked III, which is 70 cm. from the bulb. If it is, the operator pulls lightly on the tube; if some resistance is felt, the bulb is, in all probability, in the duodenum. If no resistance is felt, the rubber bulb is distended and traction again made on the tube. If again no resistance is felt, the bulb is still in the stomach, in which case it must be left longer, with the hope that it will finally arrive in the duodenum. If, after distention of the bulb, distinct resistance is felt when traction is made upon the tube, the instrument is slowly withdrawn until the bulb is at the pylorus, where a greater resistance is felt. When it is attempted at this point to withdraw the instrument still farther, it feels as though the instrument was held fast by something which might be pulled out with it if sufficient force were used. The rubber bulb must now be made somewhat smaller by the withdrawal of a small amount of air until with moderate traction the bulb can be drawn through the pylorus. The operator should then estimate the amount of air in the instrument by reading the graduated hand pump. The air is then exhausted, and the instrument withdrawn.

<sup>1</sup> Archiv f. Verdauungskrankheiten, 1911, Band xvii, Heft 1, p. 35.

<sup>2</sup> Berliner klin. Wochenschr., 1911, No. 5, p. 200.

After the instrument is washed and dried, the same amount of air is introduced into it as was indicated by the reading on the hand pump. The circumference of the bulb is then measured, which serves as an index of the degree to which the pylorus was dilated.

Einhorn recommends the use of his pylorus dilator only in true cases of pylorus spasm, and in such cases it should be of service if the condition, such as ulcer, upon which the spasm is dependent, is not harmed by the dilatation. It is evident from the above description of the use of the instrument that it can be successfully employed only by one who is expert in the manipulation of instruments introduced into the gastro-intestinal tract by way of the mouth. Employed by one so equipped, I dare say, judging from the success that has attended the dilatation of the cardia in cardiospasm, that dilatation of the pylorus may prove a helpful mechanical procedure.

**Acute Gastric Dilatation.** Several articles on acute dilatation of the stomach have appeared during the past year, and cases are being reported with increasing frequency. It seems probable that the condition is being recognized earlier than it used to be, for the statistics of the mortality of the condition have improved considerably within the last few years and it is only by early recognition of acute dilatation and the immediate institution of appropriate treatment that death can be averted. The *mortality*, according to the statistics of Laffer,<sup>1</sup> Bloodgood,<sup>2</sup> and Neck,<sup>3</sup> was respectively 63.5 per cent., 71 per cent., and 73.43 per cent., whereas the most recent statistics, those of Payer,<sup>4</sup> give a mortality of 53.43 per cent. Undoubtedly, when physicians are sufficiently familiar with the clinical picture of acute gastric dilatation to recognize it early and institute the proper treatment, the mortality will be reduced much more.

Kayser<sup>5</sup> describes the most important symptoms of acute gastric dilatation as follows:

"Severe vomiting, occurring usually after narcosis, which frequently shows the admixture of biliary elements, but never of feces; nausea, pressure, and pain in the upper abdomen; profound thirst; a rapidly developing picture of severe illness; dry tongue, fissured lips, injected eyes, cyanosis, superficial and rapid breathing; a small, rapid, and often irregular pulse; subnormal temperature and cold extremities.

"In addition to these symptoms, there can usually be recognized a distinct prominence in the upper abdomen which frequently assumes enormous proportions. The clinical variations from this picture

<sup>1</sup> Annals of Surgery, 1908, vol. xlvii, pp. 390 and 532.

<sup>2</sup> Ibid., 1907.

<sup>3</sup> Münchener med. Wochenschr., 1906, No. 32, p. 1561.

<sup>4</sup> Mitteilungen aus den Grenzgebieten der Med. u. Chir., 1910, Band xxii, Heft 3.

<sup>5</sup> Deutsche Zeitschr. f. Chir., 1908, Band xciv, p. 297.

differ from it in such slight degree that they in no wise diminish the impressiveness of the picture."

The *etiology and pathogenesis* of acute dilatation of the stomach continue to be quite as much matters of conjecture as almost since the condition was first recognized. As an indication of this, we may take the following extraordinary list of names that have been applied to the condition by various observers:

High ileus (Rokitansky and his predecessors), duodenal obstruction (Rokitansky, Heschl, Förster), duodenal compression (Kausch), mesenteric incarceration of the intestines (Schnitzler), arteriomesenteric ileus (P. Albrecht), acute gastrectasis (Bamberger, Brinton, Hanau), acute overwork of the stomach (Boas), gastromesenteric intestinal obstruction (Zade), acute pyloric obstruction (Mikulicz and Kausch), duodenojejunal intestinal obstruction (Walzberg), gastroplegia (Grundzach), postoperative gastric dilatation (The English School), gastrojejunal obstruction (Stieda), gastric ileus (Witzel), acute gastric paralysis (v. Herff), acute gastric paralysis with and without intestinal obstruction (Lichtenstein), combined ileus (Hochenegg), pseudo-ileus (Reichel, Haeberlin), duodenal ileus (Eugen Albrecht), mesenteric duodenal obstruction (Binswanger), mesenteric ileus (H. Albrecht).

Formerly the great argument was as to whether the gastric paralysis or the closure of the duodenum by pressure of the root of the mesentery was the primary factor in the pathogenesis of the condition. Today, however, the majority of observers agree that the gastric paralysis is primary. This view is based upon the results of autopsy experiments, upon the complete absence of the signs of gastric peristalsis, and upon the fact that duodenal stenosis is not always accompanied by acute gastric dilatation, as was proved by the two cases reported by Axhausen and described in *PROGRESSIVE MEDICINE* for December, 1909.

There is still a great deal of discussion as to whether acute dilatation can occur in a previously healthy stomach, or whether the stomach must be previously diseased for acute dilatation to develop when the exciting factor presents itself. The trend of opinion is to the effect that dilatation may occur in a previously healthy stomach, but that in some individuals there seems to exist a predisposition to acute dilatation.

Though acute dilatation is seen most frequently after narcosis, it occurs with all of its characteristic features in other states. Payer mentions the following as having been claimed to be *predisposing factors to acute dilatation*:

Factors of an anatomical nature: Too long a mesentery; too short a mesentery; incomplete development of the mesentery; fetal anomalies in its development; an abnormally deep position of the duodenum; an unusually horizontal course of the duodenum over the vertebral column; other peculiarities in the course or form of the duodenum;



lordosis; enteroptosis; an abnormally vertical position of the stomach; gastrectasis; tight-lacing; meteroism or abnormal descent of the transverse colon.

Factors which lead to emaciation or general weakness: Typhoid fever; scarlet fever; tuberculosis; anemia; pneumonia; and general malnutrition.

Gastric diseases: Gastric catarrh; pyloric stenosis; weakness of gastric musculature; motor weakness after increased eating; too much eating.

Various other factors: Rigidity of the abdominal muscles; relaxation of the abdominal wall; trauma to the central nervous system; disease of the spinal cord; great emotional excitement before operation; psychic diseases; descent of the intestines from too long lying on the back; too complete evacuation of the intestines before operation; alterations of intra-abdominal pressure.

Among the *actual casual factors* mentioned by different observers, are: Narcosis; toxins; increased gas formation combined with toxic paralysis; direct injury to the musculature of the stomach by the narcotic; excretion of the narcotic through the stomach; postnarcotic vomiting, forcing the intestines into the pelvis; narcosis with subsequent ingestion of liquids; peritonitis; exposure and cooling of the stomach during operation; mechanical injury to the nervous mechanism of the stomach; trauma in general; trauma to the epigastrium; bacterial putrefaction; primary gastro-intestinal paralysis; overfilling of the stomach with liquids or solids; pyloric spasm; paralysis of the stomach by poisons, among which are mentioned veronal and scopolamin-morphine; laparotomy in general; operations on the biliary tract; injury to or disease of the medulla oblongata; profound emotional disturbances; fear of operation; lesions of the spinal cord; irritation of the solar plexus; irritation of the splanchnics from injury of the fourth and fifth dorsal vertebræ; inclusion of both vagi in the tumor mass of an esophageal cancer; various mechanical factors, such as slit-like stretching of the pylorus from overfilling of the stomach, weakness of the abdominal wall, too powerful action of the abdominal musculature, involuntary rigidity of the abdominal wall, compression of the abdomen by a plaster-of-Paris jacket, benign and malignant duodenal stenosis, adhesions of the stomach with neighboring organs, compression of the duodenum by tampons, abnormally deep position of the diaphragm from pneumonia, removal of an abdominal tumor, resulting in an excess of space within the abdomen, emptiness of the intestines, permitting them to sink into the pelvis; floating kidney; floating liver; the administration of active laxatives to a person with a weak constitution; saline laxatives, which by osmosis increase the amount of liquid in the stomach.

Payer believes that mild degrees of acute dilatation of the stomach

are very frequently associated with narcosis, and, in fact, that post-narcotic vomiting is but a symptom of early acute dilatation. These features of the subject are, however, fully discussed in *PROGRESSIVE MEDICINE* for June, 1911.

In the *treatment* of the milder forms of acute dilatation, Payer thinks that it is often sufficient to place the patient on the right side; if this does not suffice, then the patient must be kept almost continuously with the hips greatly elevated. In addition, a stomach tube should be passed a number of times during the day and the collected fluids removed. The most important element in the treatment consists in the early recognition of the threatened or fully developed condition and the immediate institution of appropriate treatment.

A case of great interest in its bearing upon the etiology as well as the symptomatology of acute gastric dilatation is reported by Schlesinger.<sup>1</sup> The patient, in addition to the characteristic symptoms of acute dilatation, had distinct fecal vomiting. This phenomenon denotes that, at least in Schlesinger's case, obstruction of the duodenum by the root of the mesentery could not have been an etiological factor. Schlesinger believes that in treatment the most important factor is the placing of the patient for a sufficiently long time with the hips sufficiently elevated.

Farquhar<sup>2</sup> reports a case in which the dilatation was apparently due to an overindulgence in dried figs. Operation was performed and the patient recovered. Kuru<sup>3</sup> has collected and reported the instances of acute gastric dilatation which have occurred in Japan and adds several cases of his own.

Hertz<sup>4</sup> writes upon *chronic dilated stomach*. He recognizes a primary atonic dilatation usually the result of wasting disease or depressive conditions of the central nervous system, and the more usual form which is secondary to pyloric obstruction. His article is a very readable one, but contains nothing outside of the generally accepted views in regard to diagnosis and treatment.

For pure folly and ridiculous, unfounded claims, an article on "Atonic Dilatation of the Stomach," by Mitchell,<sup>5</sup> excels among the articles on diseases of the digestive tract that I have seen during the past year. He divides atonic dilatation into four stages, as follows: (1) Gastric stasis; (2) chronic distention; (3) mucogastritis; and (4) atonic dilatation. How wrong his comprehension of atonic dilatation is may be gained from the fact that he mentions the following as the symptoms of the condition: (1) Great enlargement of the stomach, its upper limit being frequently high up in the axillary line, and its lower limit

<sup>1</sup> Berliner klin. Wochenschr., 1911, No. 12, p. 517.

<sup>2</sup> British Medical Journal, 1911, No. 2621, p. 675.

<sup>3</sup> Mitteilungen aus den Grenzgebieten d. Med. u. Chir., 1911, Band xxiii, Heft 2.

<sup>4</sup> British Medical Journal, 1911, No. 2618, p. 477.

<sup>5</sup> Lancet, 1911, No. 4561, p. 225.

frequently reaching as far as the symphysis pubis. (2) Succussion; the splash can be obtained at any time. (3) Sense of distention and weight, a dragging feeling, due to stretching of the peritoneum, which actually assumes the role of "suspensory ligaments." (4) Vomiting of large quantities of fluid of an intensely acid character, which is highly irritating to the esophagus, pharynx, and nasal passages. (5) If there are any of the patches called "granular erosions" there is a great tenderness on pressure. (6) These symptoms are liable to frequent exacerbations, particularly if there is overdistention with gas, and during these paroxysms the patient may roll on the floor in agony.

The most remarkable portion of the article is that which concerns treatment. Preparatory to administering the treatment, the patient is placed upon his back and the physician listens with the use of a phonendoscope to the sounds, which during manipulation are heard over the stomach. The following sounds are described and their significance indicated: "Pistol-shot sound," indicating small successive quantities of gas passing through the pylorus. "Explosion sound," indicating large quantities of gas passing through the pylorus. "Sizzling sound," indicating small quantities of fluid passing through the pylorus. "Gushing sound," indicating larger quantities of fluid passing through the pylorus. "Debauch," denoting a long-continued rush of fluid occurring toward the end of treatment, when the stomach completely empties itself into the duodenum. "Waves," which consist of (a) a "crunching sound," due probably to the churning movements of the antrum, and (b) a "sighing sound," which is obtained only in an empty stomach across which peristaltic waves are passing.

The treatment which elicits this great variety of gastric sounds is described by Mitchell as follows: "With the patient flat on his back, place the phonendoscope on the right of the umbilicus and seat yourself on his right side, facing his head. Place your right hand on the patient's abdomen, with the tips of the fingers at the costal margin, find the tip of the tenth rib, and with the tips of the first, second, and third fingers very gently glide, with a trembling motion, over the skin. A hard tap produces a spasm of the pylorus, and all attempts to empty the stomach are futile for some time. It is the delicate, light touch which is efficacious. After a few seconds or minutes, action will be heard, beginning in the stomach." These manipulations are continued until the stomach is entirely emptied. A number of cases are quoted to prove the extraordinary efficiency of the treatment and the rapidity with which cure is effected. I have not tried the method described, but I do not hesitate to venture the opinion that the sounds heard are the normal peristaltic sounds of the stomach, and the results obtained are probably the ordinary effect of a manipulative procedure on neurotic patients.

**Hourglass Stomach.** The bilocular, or so-called hourglass stomach, may be congenital, organic acquired, or spastic. Some doubt the



existence of the congenital form; it is, at any rate, of infrequent occurrence; the spastic form has also been observed but seldom. By far the most common type is the organic acquired form, which usually results from the contractures incident to the process of healing of an ulcer or ulcers on the lesser curvature of the stomach. Occasionally this form may occur as a result of gastric carcinoma. Rowlands<sup>1</sup> describes 6 cases of hourglass stomach coming under his observation. Five were postulcerous, the sixth carcinomatous. In addition to the usual symptoms of chronic, severe, obstructive gastric disease, Rowlands quotes the following from Moynihan<sup>2</sup> as describing the most essential diagnostic features of the condition:

"If the stomach tube be passed and the stomach washed out with a known quantity of fluid, the loss of a certain quantity will be observed when the return fluid is measured. Thus if 30 ounces be used, only 24 can be made to return. Wölfler, who called attention to this sign, said that some fluid seemed to disappear 'as though it flowed through a large hole,' as, indeed, it has, in passing from the cardiac to the pyloric pouch (Wölfler's 'first sign').

"If the stomach be washed out until the fluid returns clear, a sudden rush of foul, evil-smelling fluid may occur; or if the stomach be washed clean, the tube withdrawn and passed again in a few minutes, several ounces of dirty, offensive fluid may escape. The fluid has regurgitated through the connecting channel between the pyloric and cardiac pouches (Wölfler's 'second sign').

"Paradoxical Dilatation. If the stomach be palpated and a succussion splash obtained, the stomach tube passed, and the stomach apparently emptied, palpation will still elicit a distinct splashing sound. This is due to the fact that only the cardiac pouch is drained; the contents of the pyloric pouch remain undisturbed, and cause the splashing sound on palpation. For this phenomenon Jaworski has suggested the appropriate name of 'Paradoxical Dilatation.' Jaboulay has pointed out that if the cardiac loculus be filled with water, a splashing sound can still be obtained by palpation over the pyloric pouch. The sign of paradoxical dilatation is best elicited after washing out the stomach in the ordinary manner. When the abdomen is examined at the completion of the washing, and when the stomach has been apparently drained quite dry, a splashing sound is readily obtained, for some of the fluid used has escaped into the pyloric pouch through the connecting channel.

"Von Eiselsberg observed in one of his cases that upon distending the stomach, a bulging of the left side of the epigastrium was produced; after a few moments this gradually subsided, and concomitantly there was a gradual filling up and bulging of the right side.

<sup>1</sup> British Medical Journal, 1911, No. 2621, p. 669.

<sup>2</sup> Medico-Chirurgical Transactions, 1904, No. lxxxviii, p. 143.

"Von Eiselsberg also called attention to the bubbling, forcing, 'sizzling' sound which can be heard when the stethoscope is applied over the stomach after distention with carbon dioxide. If the two halves of a Seidlitz powder are separately given, and the stomach be normal or dilated, no loud sound is heard anywhere except at the pylorus; if a constriction is present in the stomach, a loud, forcible, gushing sound can be easily distinguished at a point two or three inches to the left of the middle line.

"I first called attention two years ago to a sign which I have since found of great service in establishing a diagnosis of hourglass stomach. The abdomen is carefully examined, and the stomach resonance is percussed. A Seidlitz powder in two halves is then administered. Upon percussing after about twenty or thirty seconds, an enormous increase in the resonance of the upper part of the stomach can be found, while the lower part remains unaltered. If the pyloric pouch can be felt or seen to be clearly demarcated, the diagnosis is inevitable, for the increase in resonance must be in a distended cardiac segment. If the abdomen be watched for a few minutes, the pyloric pouch may sometimes be seen gradually to fill and become prominent.

"Schmidt-Monard and Eichhorst have both seen a distinct sulcus between the two pouches inflated with carbon dioxide. . . . The two aids to diagnosis of greatest value are, it will be seen, the washing out of the stomach and its inflation with gas by the administration of a Seidlitz powder in two portions."

Though these methods may be found to suffice for the diagnosis, Rowlands states that the most reliable method is skiagraphy after the administration of bismuth. Even with this method great care is necessary, for an hourglass contraction may be overlooked if the stricture is very tight, or an hourglass contraction may be diagnosed when none actually exists. This error is due, according to Hertz, to the weight of the bismuth in the lower part of a dilated, dropped stomach. The bismuth drags upon and narrows the middle part of the stomach, giving it an appearance somewhat resembling, but not identical with, that due to hourglass contraction. The latter condition was apparently partially responsible for the error in diagnosis made by Golubinin<sup>1</sup> in a case of pyloric stenosis with greatly dilated stomach, which he thought to be an hourglass stomach.

Schlesinger and Nathanblut<sup>2</sup> also claim that skiagraphy is essential to a diagnosis of hourglass stomach. They claim that, in the differential diagnosis, not only are pure spastic contractures of importance, but also reduplications of the mucous membrane and spastic contractures in association with ulcers or other organic lesions. In cases of this latter type, medical treatment may be sufficient to abolish the condition.

<sup>1</sup> Internat. Beiträge z. Path. u. Therap. d. Ernährungsstörungen, 1910, Band ii, Heft 1, p. 11.

<sup>2</sup> Mitteilungen aus den Grenzgebieten d. Med. u. Chir., 1911, Band xxii, Heft 5.

The authors believe, however, that in such cases skiagraphic examinations should be made every six or twelve months in order to be assured that no organic contracture devoid of symptoms is taking place.

Schüle and Walther<sup>1</sup> describe an unusual complication of an hour-glass stomach. This consisted in the rotation of the pyloric segment of an hourglass stomach producing complete obstruction and, in spite of operation, terminating in death.

**Volvulus of Stomach.** In an article on volvulus of the stomach, Mühlfelder<sup>2</sup> states that upward alterations in the position of the stomach may result from shrinking or atrophy of the lung in association with left-sided pleurisy, meteorism, ascites, abdominal tumors, pregnancy, tight lacing, and abnormally high position of the diaphragm and rupture of the diaphragm. An abnormally low position of the stomach occurs in gastropptosis or enteroptosis, in all conditions in which the muscles of the abdominal wall are abnormally relaxed, in relaxation of the gastric ligaments, in emaciation, in kyphosis and lordosis, in swelling of the liver and pancreas, in conditions associated with an increase in volume of the left lung, in conditions of abnormal position of the diaphragm as a result of the collection of blood, serum, pus, or air in the left pleural cavity, and in sinking of the liver or spleen. Lateral displacements are the results of changes in the contents of the splenic flexure of the colon. Causes of malpositions which lie in the stomach itself are inflammatory adhesions with the surrounding organs, malignant tumors, and distentions by fluid or gas. Of all of the malpositions of the stomach, the only one which is looked upon as constituting a distinct pathological condition is the displacement downward. Mühlfelder thinks that quite as important a condition, though by no means as frequent a one, is rotation of the stomach upon its long axis, constituting a volvulus.

The author divides volvulus of the stomach into the following five varieties:

1. Volvulus in association with diaphragmatic hernia. As to whether or not the volvulus in this type causes complete obstruction depends upon the size of the opening in the diaphragm and the pressure to which the organs are subjected.

2. Volvulus caused by a gastric tumor. This variety presupposes a considerable weight of the tumor, its situation such as to cause tension, and its freedom from adhesions with the surrounding parts.

3. Volvulus as a result of anomalies in position of neighboring organs. In four of the reported cases this organ was the spleen, in one case the pancreas as well being displaced.

4. Volvulus as a result of inflammatory changes in the stomach or its neighborhood.

<sup>1</sup> Archiv f. Verdauungskrankheiten, 1911, Band xviii, Heft 1, p. 82.

<sup>2</sup> Ibid., Band xvii, Heft 1, p. 53.



5. Idiopathic volvulus. It is impossible to explain several of the cases which have been reported upon the basis of the pathological findings which have been active in the above-mentioned groups.

Mühlfelder quotes Borchardt as giving the following three symptoms as characteristic of volvulus of the stomach: (1) Acute gastric metorism; (2) difficulty or impossibility of passing a stomach tube; (3) singultus in association with the symptoms suggestive of ileus. To these Payer adds the following three symptoms: (1) sinistocardia; (2) difficulty of, finally, total abolition of swallowing; (3) Faure's symptom—pain in the region of the heart, radiating to the back.

The diagnosis, as Mühlfelder states, is by no means an easy one, but if the symptoms are at all characteristic, they should at least suggest the possibility of a volvulus, when the appropriate treatment, which is purely surgical, should be instituted without delay.

## DISEASES OF THE INTESTINES

**Duodenal Contents.** A number of articles have appeared within the past year, especially by American gastro-enterologists, dealing with mechanical methods of directly obtaining duodenal contents or of directly treating the duodenum. Einhorn's method and Gross' claim of priority were mentioned in *PROGRESSIVE MEDICINE* for December, 1910. Hemmeter<sup>1</sup> calls attention to the fact that though Einhorn makes no mention of it in his various publications, both he (Hemmeter) and Kuhn had perfected methods of catheterizing the duodenum and had made use of them at least twelve years ago. In comparing the relative advantages of the Einhorn and Kuhn instruments, Hemmeter thinks the former is serviceable in those cases in which gastric peristalsis can be depended upon, in which one must proceed with caution in order to spare the patient any discomfort, in which there is definitely neither stenosis nor spasm of the pylorus, and in which time is not a factor. Kuhn's instrument is, however, preferable when the pylorus must be passed without delay; this method possesses the further advantage of not requiring the administration of food to accomplish the passage of the pylorus.

Einhorn and Rosenbloom<sup>2</sup> publish the results of a series of observations they conducted by means of the Einhorn duodenal pump. They found that in the fasting condition the duodenum contains an active digestive fluid, that secretin, whether given by mouth or hypodermically, elicits usually a large amount of active digestive fluid, and that a similar result attends the drinking of bouillon or water. They found

<sup>1</sup> *Archiv f. Verdauungskrankheiten*, 1911, Band xvii, Heft 2, p. 136.

<sup>2</sup> *Internat. Beiträge z. Path. u. Therap. d. Ernährungsstörungen*, 1910, Band ii, Heft 2, p. 184.

that tea, with milk or sugar added, produced no noteworthy change in the secretion. The administration of pilocarpine produced an abundant and active secretion. In opposition to the results obtained by physiologists in previous experiments, they found that sodium bicarbonate stimulated rather than depressed the secretion.

In another report, Einhorn<sup>1</sup> gave the results of his use of the duodenal pump in various pathological conditions. He found that in 7 cases of achylia gastrica, trypsin was entirely absent in 2, and but very faintly present in a third. He thinks this disturbance of pancreatic function explains the frequency of intestinal disturbances in achylia gastrica. He found, furthermore, that mucus occurs in the duodenal contents in two different forms. It can be thoroughly and uniformly mixed with the duodenal contents, or it can occur as small particles in an otherwise clear liquid. Einhorn thinks that the latter condition denotes an origin of the mucus from the duodenum, whereas the former condition speaks more for the origin of the mucus from the pancreas or the biliary tract. The presence of mucus in conjunction with other clinical symptoms, such as diarrhea, or epigastric discomfort some time after a meal, would point to duodenal catarrh.

A study of the chemical constituents of the human duodenal secretion was made by Gross, Oefele, and Rosenberg,<sup>2</sup> using Gross' method of obtaining duodenal contents.

Gross<sup>3</sup> also recommends the use of his duodenal pump to obtain duodenal contents for diagnostic purposes in cases of suspected duodenal ulcer and as a means of applying lavage directly to the duodenum. Though I have not used this method, I should very much fear harmful results from attempting to obtain duodenal contents by means of the pump in duodenal ulcer. Gross suggests that trauma might have resulted from the instrument in one of his cases, but in no other case did he entertain any such suspicion.

**Duodenal Nourishment.** Einhorn<sup>4</sup> goes even farther and suggests the nourishing of patients by introducing food directly into the duodenum. He presents the histories of several cases in which the nourishment was carried on in this way with more or less success. The method appears as one that might be of considerable service in cases in which it is either impossible or unwise to nourish the patient for a period by means of the stomach. I fail to see, however, wherein the method can be of value in cases of duodenal ulcer, one of which is reported by Einhorn as having been nourished in this way.

**Duodenal Capsule.** Something in the nature of a modification of the Einhorn duodenal bucket is proposed by Sarnizyn.<sup>5</sup> The method

<sup>1</sup> Deutsche med. Wochenschr., 1910, No. 33, p. 1519.

<sup>2</sup> Wiener klin. Wochenschr., 1910, No. 32, p. 1165.

<sup>3</sup> Ibid., No. 52, p. 1881.

<sup>4</sup> Berliner klin. Wochenschr., 1910, No. 34, p. 1571.

<sup>5</sup> Ibid., p. 1573.

consists in having the patient swallow a capsule, which is dissolved only when arriving in the duodenum and which contains a second capsule made of silver and constructed as follows: It is completely closed excepting for a small, round opening at one end; within it contains a sponge, and to the end of this sponge, opposite the opening in the capsule, is attached a silver plate, slightly larger in diameter than is the opening in the capsule. When the outer capsule is dissolved in the duodenum, the duodenal contents come in contact with the sponge, causing it to swell and thus close the opening in the capsule by means of the small plate attached to it. The silver capsule thus passes through the remainder of the intestinal tract and is recovered from the feces. The fluid in the sponge is then tested for the presence of duodenal secretions.

**Duodenal Ulcer.** Since the English and American surgeons have called attention to the relative frequency with which duodenal ulcer is met, one can notice that the continental and especially the German surgeons and clinicians pay much more attention to the condition than formerly, and several comprehensive articles on the topic have recently appeared. They contribute nothing radically new to the subject, but in several instances present new aspects of considering various phases of the subject. Melchior<sup>1</sup> reports a number of cases of duodenal ulcer, in one of which the ulceration apparently occurred immediately after amputation of an arm for sarcoma. He calls attention to the fact that at least 9 cases have been reported in which duodenal ulceration was discovered at autopsy after amputation of a limb, and in 3 of these cases the amputation was undertaken on account of tumor. He mentions the frequency of duodenal ulcer in septic processes and after extensive burns, but believes that this throws little light upon the etiology of the usual chronic form of duodenal ulcer, because it has never been observed that these ulcers have become chronic. Of more importance than this is the fact, I believe, that the ulceration occurring after extensive burns is in its general pathological features quite unlike chronic duodenal ulcer. Nevertheless, there seems to be some intimate relationship between duodenal ulceration and septic processes and extensive burns, for the general frequency of duodenal ulcer as an autopsy finding is but 0.4 per cent., in septic processes it is 2.7 per cent., and in extensive burns 3.3 per cent.<sup>2</sup> Seyffarth<sup>3</sup> calls attention to the association of duodenal ulcer and Bright's disease, an association that was present in one of his cases.

Kemp,<sup>4</sup> considering the *relative frequency of duodenal and gastric ulcer*, notes that the *relative frequency*, according to the combined

<sup>1</sup> Berliner klin. Wochenschr., 1910, No. 51, p. 2330.

<sup>2</sup> Perry and Shaw, Guy's Hospital Reports, 1894.

<sup>3</sup> Deutsche med. Wochenschr., 1911, Nos. 15, 16, and 17.

<sup>4</sup> Zeitschr. f. klin. Med., 1911, Band lxxii, Heft 5 and 6, p. 519.



statistics of most of the European observers, is about 1 to 16. This is in striking contrast with the frequency observed by American and English surgeons. Murphy,<sup>1</sup> in his operative cases, found a relative frequency of duodenal to gastric ulcer in the proportion of 1 to 3, Moynihan,<sup>2</sup> 1 to 4; and W. Mayo,<sup>3</sup> 1 to 3.5. In Mayo's<sup>4</sup> latest statistics, the frequency of duodenal ulcer exceeded that of gastric ulcer. Kemp finds it difficult to explain these discrepancies. He thinks that they may be in part due to the lack of care with which the duodenum was inspected in the earlier pathological reports, and partly to the fact that some surgeons may not be very exacting in regard to the signs which they take to denote the presence of duodenal ulcer.

In the 10 cases reported by Kemp, several of the striking *characteristics of duodenal ulcer* are exemplified. For instance, 9 of the 10 patients were males and in 9 out of the 10 cases, the ulcer was located in the superior, horizontal portion of the duodenum.

In a study of the gastric functions of his patients, Kemp noted two conditions which have in the past not been generally considered as symptoms of duodenal ulcer. One of these was a definite hypersecretion of a continuous rather than a digestive type, present in 8 out of 9 cases studied. In the ninth case, there was more or less of a digestive hypersecretion. He found also a more or less definite motor insufficiency in 7 of the 9 patients whose motor functions were studied. (It is very possible that this motor insufficiency was responsible for the symptoms of hypersecretion.) Kemp further believes that pyloric spasm is a much more frequent phenomenon in duodenal ulcer than in gastric ulcer.

The *string test* in its relation to the diagnosis of gastric or duodenal ulcer is reported upon by Einhorn,<sup>5</sup> the originator of the test, and Morgan.<sup>6</sup> Einhorn thinks that the test is quite as serviceable in denoting the progress toward healing in a case as it is aiding toward a diagnosis. Morgan reports favorably upon the test, and thinks that it should be used in all instances in which there is any basis for the suspicion of the existence of an ulcer. He proposes a slight modification of the test, which makes it somewhat more susceptible of general usage. This modification consists merely in the substitution of a BB shot surrounded by a capsule in place of the bucket recommended by Einhorn.

**TENDERNESS IN DUODENAL ULCER.** According to Mendel,<sup>7</sup> the most valuable diagnostic point in duodenal ulcer is the determination, by

<sup>1</sup> British Medical Journal, 1906, p. 1301.

<sup>2</sup> Lancet, 1905, p. 340.

<sup>3</sup> British Medical Journal, 1906, p. 1299.

<sup>4</sup> Journal of the American Medical Association, August, 1908.

<sup>5</sup> Archiv f. Verdauungskrankheiten, 1911, Band xvii, Heft 2, p. 150.

<sup>6</sup> American Journal of the Medical Sciences, 1911, No. 470, p. 649.

<sup>7</sup> Deutsche med. Wochenschr., 1910, No. 37, p. 1701.

direct percussion, of a tender area, about the size of a fifty-cent piece, just to the right of the midline immediately below the margin of the ribs. This area must be determined by direct percussion alone, and its most characteristic feature is its sharp demarcation. According to Mendel, this tender area decreases in diameter as the patient improves, and it can consequently be used as an indication of progress.

Kemp summarizes as the most dependable *features of duodenal ulcer*: (1) Its tendency to occur more frequently in men than in women; (2) its well-marked periodicity with a tendency to longer or shorter periods of latency; (3) the regular appearance of pain at a definite period after each meal; (4) pain and tenderness in the epigastrium to the right of the midline; (5) repeated occurrence of melena, or long-continued occult bleeding without hematemesis; (6) a severe degree of digestive and continuous hypersecretion; (7) frequent and severe attacks of pyloric spasm.

The general diagnostic features of duodenal ulcer are ably considered by Cheney,<sup>1</sup> who in addition reports several instances of the condition.

Pilcher<sup>2</sup> considers the characteristic *pain of duodenal ulcer* to be due to the contact of the acid or hyperacid gastric juice with the ulcerated surface. In order to determine the cause for the cessation of this pain as soon as food is taken into the stomach, he performed some animal experiments, and found that when food is taken into the stomach it excites at once a reflex secretion in the duodenum which is sufficient in amount and alkalinity to neutralize the acidity of the gastric juice. This assumption of Pilcher's of the cause of pain in duodenal ulcer is not supported by the experimental observations of Hertz on the sensibility of the gastro-intestinal tract which are mentioned below.

**Intestinal Obstruction.** Greig<sup>3</sup> reports an interesting case of intestinal obstruction caused by an enterolith which was evacuated spontaneously through an umbilical fistula, and Wright<sup>4</sup> reports a case of obstruction which at operation was found to be caused by a hair-ball, and in which a second hair-ball was found in the stomach. The latter weighed two pounds twelve and three-quarter ounces, and was over eleven inches in length.

Watson<sup>5</sup> reports as a new method of *diagnosis of acute intestinal obstruction*, the early passage of the stomach tube. This method, however, was described by Ewald<sup>6</sup> in 1907, and noted in PROGRESSIVE MEDICINE for December, 1908.

**The Diagnosis and Treatment of Intestinal Ulceration** is considered at some length by Ewald,<sup>7</sup> who classifies intestinal ulcers as follows:

<sup>1</sup> American Journal of the Medical Sciences, 1911, No. 468, p. 328.

<sup>2</sup> Ibid., No. 470, p. 687.

<sup>3</sup> Lancet, 1910, No. 4553, p. 1613.

<sup>4</sup> Ibid., 1911, No. 4567, p. 662.

<sup>5</sup> Journal of the American Medical Association, 1911, vol. lvi, No. 24, p. 1800.

<sup>6</sup> Berliner klin. Wochenschr., 1907, No. 44, p. 1416.

<sup>7</sup> Deutsche med. Wochenschr., 1911, No. 14, p. 625.

1. Ulcers resulting from necrobiotic processes: Peptic duodenal and jejunal ulcers, ulcers resulting from severe surface burns, embolic and thrombotic ulcers, amyloid ulcers, ulcers occurring in intestinal helminthiasis.

2. Ulcers resulting from inflammatory processes: Catarrhal ulcers, follicular ulcers, stercoral and decubital ulcers, stenosis ulcers.

3. Ulcers occurring in the course of acute infections, principal among which are typhoid, dysentery, anthrax, sepsis, erysipelas, and variola.

4. Ulcers occurring in chronic infections: Tuberculosis, syphilis, actinomycosis.

5. Ulcers occurring in constitutional diseases: Gout, scurvy, leukemia, arteriosclerosis.

6. Toxic ulcers: Uremic ulcers, mercurial ulcers, arsenic, antimony, and phosphorus ulcers.

**DISTENTION ULCERS.** There has been much speculation as to how intimate an etiological relationship exists between stenosis of the intestines and the distention ulcers, or as they are at times called, stenosis ulcers, that are frequently found in the intestines above the level of the stenosis. Shimodaira<sup>1</sup> conducted a series of experiments tending to throw some light upon this question. He found that ulcers can be experimentally produced through simple distention of the intestines. A high degree of distention so inhibits the arterial flow in the intestinal wall that anemic gangrene quickly results. When, on the other hand, after a moderate degree of distention has existed for a considerable period, this is suddenly released, there results such an extensive venous hyperemia from vascular paralysis that again gangrene occurs. Ulcers and even perforation thus occur as a result of necrosis of the intestinal wall following the congestion of localized vascular paralysis. This necrosis results, on the one hand, from hemorrhage following congestion, which may be increased by thrombosis formation, and, on the other hand, from disturbances of nutrition caused by excessive distention of the injured intestinal wall. In the experimentally produced ulcers and perforations, he found that bacteria and the toxins of the intestinal contents were not a factor. Bacteria, however, had some influence upon the further progress of the ulcerative processes. Shimodaira concluded, therefore, that the ulcers commonly found in the intestines above the level of stenosis in chronic obstruction owe their origin to excessive distention of the intestinal wall, and that therefore the name "distention ulcer" is the most appropriate name for them.

**Chronic Bone Disease and Intestinal Disturbances.** Koll<sup>2</sup> makes a very interesting contribution concerning 4 cases of chronic bone disease associated with intestinal disturbances. In all 4 cases a fetid diarrhea

<sup>1</sup> Mitteilungen aus den Grenzgebieten der Med. u. Chir., 1910, Band xxii, Heft 2.

<sup>2</sup> Deutsches Archiv f. klin. Med., 1910, Band c, Heft 5 and 6, p. 487.



had existed for years, and all of them showed progressive vegetative disturbances of the bones which manifested themselves partly in disturbances of the epiphyseal bone development, partly in hyperplastic processes, partly in atrophic and absorptive phenomena. In 2 of the cases there is no doubt of the direct etiological relationship existing between the bony changes and the intestinal disturbance, for as the latter were cured, the former disappeared. In the remaining 2 cases, this relationship could only by analogy be assumed. These constitute the first report I have seen on bony changes resulting from intestinal disturbances. I have, however, observed a number of instances in which profound chronic monarthritic and polyarthritic changes have resulted from intestinal derangements.

**A Case of Ileocecal, Hyperplastic Tuberculosis** is reported by Walker.<sup>1</sup> In the diagnosis of this condition Stierlin<sup>2</sup> thinks that radiography is of much more service than has been thought. The radiograph should be taken five or six hours after a bismuth meal. Ordinarily under these conditions a shadow will be seen corresponding to the cecum and ascending colon. In ileocecal hyperplastic tuberculosis, however, as well as in any other condition in which similar infiltration, induration, and ulceration exist, the radiograph is characterized by an absence of the shadow representing the cecum and ascending colon.

**The General Features of the Cecum Mobile** are discussed by Straschesko<sup>3</sup> and Hausmann,<sup>4</sup> who claims the credit of first having called attention to the condition in 1904.

Fischler<sup>5</sup> claims that a large percentage of the cases diagnosticated as instances of the mobile cecum are in reality instances of what he terms typhlatony. He believes that the symptoms in these cases are not due to an abnormal motility of the cecum, but to an atony of the wall which is usually the result of slight catarrhal conditions.

Fischler describes the *symptoms* of typhlatony as the same as those that have been described as characteristic of the mobile cecum, namely:

Pain in the region of the cecum, at times spontaneous, at times colicky, and at times occurring only on manipulation.

A tumor, feeling like an air cushion, which on palpation gives rise to gurgling and usually considerable pain.

Bowel irregularity, either constipation alone, diarrhea alone, or alternations of diarrhea and constipation. In addition, there is occasionally slight fever.

The *treatment* recommended by Fischler is naturally very different from that recommended by those who believe that the condition is

<sup>1</sup> Journal of the American Medical Association, 1911, vol. lvi, No. 13, p. 955.

<sup>2</sup> Münchener med. Wochenschr., 1911, No. 23, p. 1231.

<sup>3</sup> Archiv f. Verdauungskrankheiten, 1911, Band xvii, Heft 1, p. 11.

<sup>4</sup> Deutsche med. Wochenschr., 1910, No. 42, p. 1956.

<sup>5</sup> Münchener med. Wochenschr., 1911, No. 23, p. 1235.

dependent upon an abnormal mobility of the cecum. Fischler recommends limitation of diet; gentle massage in the cecal region, in the direction of peristalsis; light exercises in the intervals between attacks; the avoidance of strong laxatives; the occasional administration of bismuth; and moist compresses at night to the region of the cecum.

**Colitis.** The general diagnostic features and therapeutic indications of colitis are discussed by Kahlo<sup>1</sup> and Power.<sup>2</sup> Power considers especially the more severe forms of colitis which frequently terminate fatally, and emphasizes the appearance of well-being that the patients frequently present despite the extreme seriousness of the condition. He mentions the serviceability of *vaccine treatment*, but calls attention principally to the great importance of resorting sufficiently early to surgical treatment in these cases, when medical means have not proved of service. The operation consists of the performance of appendicostomy with the maintenance of permanent drainage through the appendicostomy wound and anus. As Power thinks most of the severe manifestations of the colitis are due to the absorption of toxins from the colon, this through-and-through drainage should be of great service in the more severe cases.

**Enteritis Membranacea.** The occurrence of enteritis membranacea as a sequel of typhoid fever is noted by v. Czyhlarz<sup>3</sup> and by Ortnier.<sup>4</sup> Von Czyhlarz reports 4 cases and Ortnier has seen in all 6 cases of the same nature. The condition apparently may exist entirely without symptoms and consequently it is only by careful inspection of the stools in the post-typhoidal state that the condition may be recognized.

**Rectosigmoidoscopy.** The importance of rectosigmoidoscopy as a general procedure by regular practitioners as well as specialists is emphasized by Pewsner<sup>5</sup> and Ewald.<sup>6</sup> They both call attention to the frequency with which diseases, the manifestations of which are limited to the rectum or sigmoid, can be diagnosticated only by this method, the application of which can be learned without great difficulty. Ewald calls especial attention to his recognition, by use of this method in a number of instances, of the obscure cause of *severe anemias*. These were cases in which the anemia was so severe, and in which the cause seemed so obscure, as to justify their being classified as instances of pernicious anemia. However, direct inspection of the colon and sigmoid revealed the presence of hemorrhoids, 10 or 15 cm. or even farther from the anus. It was the slight constant bleeding from these which eventually produced the severe anemia. The hemorrhoids appear as small

<sup>1</sup> Journal of the American Medical Association, 1911, vol. lvi, No. 6, p. 415.

<sup>2</sup> British Medical Journal, 1911, No. 2624, p. 863.

<sup>3</sup> Archiv f. Verdauungskrankheiten, 1910, Band xvi, Heft 5, p. 576.

<sup>4</sup> Ibid., Heft 6, p. 726.

<sup>5</sup> Ibid., Heft 4, p. 454.

<sup>6</sup> Berliner klin. Wochenschr., 1911, No. 2, p. 49.

bluish-red nodules, shot-size to pea-size, on a pale red mucous membrane. The appropriate treatment for these consists in seeking out the individual hemorrhoids with the rectoscope, and lightly touching them with the Paquelin cautery. This procedure is usually not painful, but if so, can to advantage be preceded by the application of a cocaine solution. Later, colonic lavage with a mild astringent solution will be found to be of value.

Kausch<sup>1</sup> describes a rectal catheter so constructed as to facilitate *colon irrigation* in patients with a weak sphincter, and Skaller<sup>2</sup> describes the application to the colon of medicaments in the form of extremely finely divided particles, as is used especially in the treatment of nose and throat diseases.

**Chronic Constipation.** HORMONAL. Kauert<sup>3</sup> and Glitsch<sup>4</sup> report good results from the use of Zülzer's peristaltic hormone, supplied under the trade name of Hormonal. Glitsch's report is not especially convincing. So many of the general dietetic and hygienic measures generally employed in the treatment of constipation are used to supplement the treatment by hormonal, that one wonders to what the beneficial effect should be credited. Kauert employed hormonal to apparently excellent effect in cases of paralytic ileus. In 6 out of 7 cases, it seemed to have a prompt and lasting effect. According to Kauert, this gives some indication of the type of cases of chronic constipation in which the drug might be expected to be of most service, namely, those in which there seems to be an important nervous element.

The peristaltic hormone is, according to Zülzer, prepared in the stomach, but is rapidly transported from there to other organs, especially the spleen, from which it is generally prepared. Hormonal is a brown liquid, smelling strongly of carbolic acid and foaming readily on slight shaking. It is supplied in two different forms—one for intravenous injection, the other for intramuscular injection. These preparations are supposed to remain active for eight months. One injection is supposed to be sufficient, but as has been already stated, the treatment by hormonal must be supplemented by other treatment, especially dietetic treatment.

THE TREATMENT OF CHRONIC CONSTIPATION BY INJECTION OF PARAFFIN is highly recommended by Lipowski.<sup>5</sup> The paraffin must be so prepared that it just remains soft at the temperature which prevails in the colon. Lipowski thinks that paraffin has a number of advantages over oil; he mentions especially that it does not become rancid as does oil, that on account of its salve-like consistency it coats the

<sup>1</sup> Münchener med. Wochenschr., 1911, No. 18, p. 952.

<sup>2</sup> Berliner klin. Wochenschr., 1910, No. 33, p. 1535.

<sup>3</sup> Münchener med. Wochenschr., 1911, No. 17, p. 907.

<sup>4</sup> Ibid., No. 23, p. 1243.

<sup>5</sup> Münchener med. Wochenschr., 1910, No. 50, p. 2635.



intestinal wall, thus preventing too great absorption of water and protecting the mucous membrane from the irritation of hard fecal masses.

Concerning the use of paraffin, Lipowski states that it should first be definitely determined that the constipation is due to the inspissation of the feces. The injections are best administered just before the patient retires. A portion of the paraffin mass is warmed in a vessel until liquid; the danger of injecting the mass too hot can be controlled by roughly determining the temperature with the finger. The end of the rectal tube, after the latter has been warmed by immersion in warm water, is coated with the liquid paraffin, and then with the patient in the knee-elbow position or on the side, the tube is introduced 10 or 15 cm. into the rectum. Then by means of either a funnel or a syringe, either of which instruments must have been previously warmed, 200 c.c. of the paraffin solution are injected. The patient should lie still for several minutes after the injection, when the tube is removed. If no movement occurs the following morning, a supplementary injection of a half liter of physiological salt solution should be administered; as a rule, according to Lipowski, this is not necessary. After the stools have become moderately well regulated, usually after eight or ten days, the amount injected is reduced to 100 c.c.; after another eight or ten days the paraffin injections should be administered but every other night. If no stool occurs on the morning following the evening when no injection was given, an enemata of normal salt solution should be administered.

Burroughs<sup>1</sup> records the success that has attended his use of *faradism of the large intestine* in chronic constipation.

**Spastic Constipation.** Some support to the claims of the existence of a spastic form of constipation is contributed by the radiographic studies of Boehm.<sup>2</sup> It has been learned from the studies of the physiologists as well as the radiographers that the large intestine may be divided into two portions; in the first portion, consisting of the cecum, ascending colon, and a small portion of the transverse colon, peristaltic waves occur in both directions; in the second portion, comprising the remainder of the large intestine, peristalsis occurs in but one direction. These two portions, when the colon is functioning, are more or less separated by a constricting furrow. Boehm finds that in cases which may be designated as instances of spastic constipation, this constricting furrow is more prominent than normally and causes a delay of the fecal masses in the first portion of the colon.

Schütz<sup>3</sup> describes a condition almost identical with spastic constipation, excepting, possibly, as to its paroxysmal nature, under the term

<sup>1</sup> Lancet, 1910, No. 4541, p. 799.

<sup>2</sup> Deutsches Archiv f. klin. Med., 1911, Band cii, Heft 3 and 4, p. 431.

<sup>3</sup> Berliner klin. Wochenschr., 1910, No. 37, p. 1703.

*chronic spasm of the colon.* He has met the condition especially in association with hysteria and hysteroneurasthenia.

In a lecture entitled, "THE KINKS WHICH DEVELOP IN OUR DRAINAGE SYSTEM IN CHRONIC INTESTINAL STASIS," Arbuthnot Lane further expounds his view of the cause and treatment of chronic constipation. He defines various locations in the intestines at which kinks occur, which delay and make difficult the normal passage of intestinal contents. The first kink he describes is at the junction of the duodenum and the ileum, the next at the lower end of the ileum, a third and fourth at respectively the hepatic and splenic flexures of the colon and several more in the descending colon and sigmoid. Though he speaks of these as the kinks which develop in chronic intestinal stasis, he apparently looks upon them as the cause rather than the results of the stasis.

In support of Lane's views, Jordan<sup>1</sup> presents a radiographic study bearing evidence of the obstruction at the junction of the duodenum and jejunum. These radiographs remind one of the contentions of Codman concerning chronic duodenal obstruction by the root of the mesentery which were considered in PROGRESSIVE MEDICINE for December, 1908.

The *treatment* which Lane employs in these cases of constipation, or, as he terms them, "chronic intestinal stasis," is anastomosis of the lower end of the ileum with the rectum, thus destroying the function of the colon. In cases in which pain has not been a prominent feature, the colon is left *in situ*, but where pain has been a feature, it is removed from the body. Chappel<sup>2</sup> gives the record of a series of cases thus operated upon by Lane to prove the serviceability of the procedure recommended.

Regardless of what one's views may be concerning the relationship of the pathogenesis of a condition to a proposed method of treatment for such condition, the repeated success of this treatment must convince one of its efficiency. So should I feel concerning Lane's operation for chronic intestinal stasis, but until I am convinced of the serviceability of the operation from the repeated observation of successful cases, I cannot but feel that such radical treatment is not rational. This view is strengthened by the results of Wakabayashi's experiments mentioned below, which show the colon to be essential to the nourishment of the body.

CHRONIC CONSTIPATION AND MYOCARDIAL DISEASE. At one time or another almost every form of functional or organic disorder has been attributed to the effects of chronic constipation. There is no doubt that chronic constipation, especially if accompanied by much fermentation or putrefaction, can be attended by profound secondary changes.

<sup>1</sup> British Medical Journal, 1911, No. 2629, p. 1172.

<sup>2</sup> Ibid., No. 2625, p. 915.

Elbstein<sup>1</sup> calls attention to chronic myocardial insufficiency resulting, as he believes, from chronic constipation. He presents the histories of several cases which, from the results attending treatment, tend to support his contention.

**Hirschsprung's Disease.** When Hirschsprung first described the condition bearing his name, he thought it to be due to a congenital hypertrophy and dilatation of the colon. Since then other observers have looked upon the dilatation of the colon more as a secondary phenomenon resulting from partial obstruction lower in the intestines. Many different types of partial obstruction have been described from time to time. Two articles have appeared during the past year dealing with this subject, one by Blochmann,<sup>2</sup> the other by Heller.<sup>3</sup> Blochmann believes that a valve-like union of the sigmoid with the rectum causes a partial obstruction which subsequently results in colon dilatation. Heller has paid great attention to the condition of the sigmoid in the vast amount of autopsy material that comes under his observation, and believes, as a result of his observations, that a congenital, abnormally large, and somewhat misplaced sigmoid is the cause of the partial obstruction in Hirschsprung's disease. He also holds that infants possessing this anomaly who do not develop Hirschsprung's disease are in later life subject to volvulus of the sigmoid.

**Palpation of the Appendix.** Rudnitzki,<sup>4</sup> in an article on the palpation of the appendix, seems to attribute to Russian clinicians, especially Obraszow, credit for having done most of the work up until the present day upon abdominal palpation. It is true that most of the articles that have appeared upon palpation of the appendix have been from the pens of Russian writers, in all probability because other observers have not thought the subject worthy of serious consideration. The articles of Orłowski, and Jaworski and Lapinski have been discussed in previous volumes of *PROGRESSIVE MEDICINE*. Rudnitzki estimates that the appendix was palpable in about 12 or 13 per cent. of the cases that he investigated. In this regard he differs materially from many other observers, especially Orłowski, who was able to palpate the appendix in approximately 50 per cent. of his patients. Rudnitzki found the appendix either painful or "hardened" in all of his cases, though but 29 out of the 72 gave any indications of present or past appendiceal troubles. Orłowski found the appendix painful in but 58.4 per cent. of the cases in which palpation was possible.

Orłowski<sup>5</sup> objects to Rudnitzki's criticism of his statistics, and apparently with justification claims the latter's statistics to be founded upon arbitrary estimations rather than upon exact investigations.

<sup>1</sup> Münchener med. Wochenschr., 1911, No. 12, p. 615.

<sup>2</sup> Berliner klin. Wochenschr., 1911, No. 13, p. 564.

<sup>3</sup> Münchener med. Wochenschr., 1911, No. 20, p. 1059.

<sup>4</sup> Archiv f. Verdauungskrankheiten, 1910, Band xvi, Heft 6, p. 704.

<sup>5</sup> Ibid., 1911, Band xvii, Heft 2, p. 156.



Aside from these differences in the frequency with which different observers have been able to palpate the appendix, there are great variations of opinion as to the significance of the findings. One of them claims that every appendix that can be palpated must be pathologically altered, another that only those that are painful on palpation are diseased, and others that not even an appendix that is painful on palpation is necessarily the seat of disease. I believe that the entire question is one of almost useless investigation and argument. Almost every appendix that is diseased will present some manifestations of the disease by the reactive phenomena in the tissues in its neighborhood. In the absence of these reactive phenomena, one would, I think, be at a loss to interpret the significance of a palpable appendix whether painful or not. Furthermore, if an appendix is normal there is no use in palpating it, and if it is diseased, I doubt if any cautious man would want to subject it to the amount of manipulation and traumatism that must be incident to the methods of palpation that have been described especially by the Russians.

**Appendicitis.** ETIOLOGY. A series of exhaustive and painstaking experiments on the pathogenesis of appendicitis were performed by Heile.<sup>1</sup> The main portion of his experiments consisted in determining what local, mechanical, chemical, and bacterial conditions determine the development of the various types of appendicitis in the dog. He concludes as follows:

Simple tying off of the dog's appendix usually leads to a reestablishment of the lumen of the appendix, after purulent destruction of portions of its wall, during which process the silk ligature is thrown off. If paraffin is injected into the lumen of the appendix peripheral to the silk ligature, the lumen of the peripheral portion of the appendix remains permanently cut off from the lumen of the intestines. This permanent separation of a portion of the appendix from the gut never leads to peritonitis or death of the animal, but only to localized inflammatory changes in the neighborhood of the ligature, which after some weeks are demonstrable only by the adhesions existing between this area and the omentum or neighboring coils of intestines.

The peripheral portion of the appendix is usually more or less enlarged and often filled with contents more or less rich in leukocytes, constituting either a hydrops or an empyema of the appendix. It contains, moreover, usually large numbers of bacteria, which, however, do not induce a progressive inflammation. The appendiceal wall surrounding this mass presents only the slightest manifestations of departure from the normal picture, which after a few weeks permit themselves to be recognized only by occasional collections of round cells. If fecal masses are present in the portion of the appendix which is tied off and

<sup>1</sup> Mitteilungen aus den Grenzgebieten d. Med. u. Chir., 1910, Band xxii, Heft 1.

closed with paraffin, there results a bacterial chemical infection of the appendiceal wall, taking its origin from the appendiceal contents, similar in all particulars to the destructive inflammation occurring in the human appendix, and leading to a purulent peritonitis, which causes the death of the dog. The destructive inflammation of the appendiceal wall conforms to one of two types: In the one there is a primary local defect which is soon accompanied by a rapidly progressive lymphangitis of the intestinal wall; in the other, there is a primary, extensive necrosis, involving first the mucosa, and rapidly spreading to the remaining walls of the appendix, leading finally to rupture; rupture in this type is favored by the rapid increase in the intra-appendiceal pressure by reason of the collection of the various elements of the inflammatory exudate. The changes in the vessels are of great significance in the course of destructive inflammations of the appendiceal wall. These changes manifest themselves either in simple congestion or infarction. The most important element in the production of destructive inflammation of the appendix is the retention of fecal contents in the lumen of the appendix; bacteria alone do not cause destructive appendicitis.

Heile believes that most of these results of his experiments are applicable to the pathogenesis of appendicitis in man. Though admitting that fecal concretions are not essential to the development of destructive appendicitis in man, they are of the greatest importance, not only on account of their mechanical action in irritating the mucosa or occluding the lumen, but also on account of their tendency to give rise to chemical irritants. These irritants he considers to be primarily derived from the decomposition of the proteid matter contained in the fecal masses.

Reference in *PROGRESSIVE MEDICINE* has, in the past, been made to the claim that proteid food is a factor in the pathogenesis of appendicitis. It is interesting to note that in addition to the above-mentioned suggestions by Heile in this connection, there has appeared an article by Williams<sup>1</sup> based upon entirely different observations, but tending strongly to the conclusion that a diet rich in proteid, especially meats, is an important etiological factor in appendicitis. Williams obtained statistics or, in the absence of these, opinions from prominent physicians and surgeons of the frequency of appendicitis among the different nations of the globe. His conclusions are, in part, as follows:

"It would be unwise to draw any broad deductions from the above incomplete statistics, except that appendicitis has a markedly different incidence in various countries, and that this different incidence may be very largely a question of diet.

"Many theses have been advanced to explain this relationship to diet. The above statistics, if they show anything, show that where there is a large meat-eating population, there appendicitis is a common

<sup>1</sup> British Medical Journal, 1910, No. 2609, p. 2016.

disease, whereas in those countries where little meat is eaten, appendicitis is rare, if not almost unknown.

"There is no doubt, according to most people, that apart from improved diagnosis, appendicitis has greatly increased in the British Isles in the last few decades. Very little evidence has so far been advanced to any explanation of this. The greatest change in the diet of the people has undoubtedly been the marked increase in meat eating. With the amount of foreign meat and canned food, the poorer classes even are now able to supply themselves in fair quantity with meat of varying kinds, more particularly mutton."

Williams, however, does not attribute the role that meat plays in the production of appendicitis to the influence of its decomposition products, but rather to the irritant action of the calcium soaps, which, he claims, are derived in considerable quantity from the saturated fatty acids which meats, especially mutton and beef, are claimed to furnish.

*Worms* of various types have, from time to time, been found in the appendix, and the thread-worm in particular has been found so frequently that this condition no longer constitutes a medical curiosity. Lediard<sup>1</sup> mentions 2 cases of this type occurring in his practice. A more unusual case is reported by Gockel,<sup>2</sup> who found portions of a *tapeworm in an appendix*. As far as Gockel was able to discover, but 5 similar cases have been reported, one each by Martin, Sprengel, Rammstedt, and Tiegel, and one discovered at autopsy in the Braunschweig public hospital. Gockel, in remarking upon his case, mentions that the tapeworm was of probably little significance as a causative agent, and that there is little reason for entertaining the opinion that in similar cases treatment directed against the tapeworm would be of much value in diminishing the appendiceal inflammation if a true inflammation exists, and not a pseudo-appendicitis caused entirely by the presence of the worm.

*Constipation*, which is generally looked upon as more or less significant in the causation of appendicitis, is held accountable for the recurrent attacks in a case reported by Maier.<sup>3</sup>

**OPERATION.** There still reigns the greatest difference of opinion among clinicians and surgeons as regards what cases of appendicitis should be operated upon, and in which stage of the disease the outcome of operation is most favorable. With the hope of aiding in the solution of the first of these questions, Kohl<sup>4</sup> undertook an exhaustive study of the leukocyte counts and the neutrophilic count, according to Arneth's system, in a large series of patients suffering with appendicitis. Kohl modifies Arneth's system of classification by counting only the number

<sup>1</sup> Lancet, 1910, No. 4542, p. 878.

<sup>2</sup> Archiv f. Verdauungskrankheiten, 1911, Band xvii, Heft 1, p. 89.

<sup>3</sup> Berliner klin. Wochenschr., 1911, No. 191, p. 844.

<sup>4</sup> Mitteilungen aus den Grenzgebieten d. Med. u. Chir., 1911, Band xxii, Heft 4.



of neutrophiles with a single nuclear segment. He finds that this gives him quite as reliable information as does the more elaborate method of classifying all the neutrophiles according to whether they contain nuclei with 1, 2, 3, 4, or 5 segments. His conclusions are as follows:

In order for the leukocyte count or the neutrophilic picture of Arneth to be of much service, they should both be charted in the form of a curve.

The leukocytes should be counted in every acute case of appendicitis, whether operation is to be performed or not. It is always to be taken into consideration in conjunction with the rest of the clinical picture, but it has fully as much significance as the curve of temperature or pulse. If it clashes with the other clinical symptoms, the curve of the neutrophilic blood picture must be brought to its aid.

In general, it can be said that the neutrophilic blood picture, according to Arneth, is an expression of the virulence of the infection, whereas the leukocytosis points on the one side to the degree of peritoneal irritation, and on the other side to the reactive power of the individual.

Increased leukocytosis in connection with a normal neutrophilic blood picture or one in which the leukocytes with a nucleus of but one segment are but slightly increased, gives a good prognosis; the higher the neutrophilic blood picture goes, the more severe is the infection, and consequently the more unfavorable the prognosis. If the leukocytosis is increased, this is an indication of good powers of resistance, and consequently a favorable prognostic sign; on the other hand, a low leukocytic count, in the presence of a high neutrophilic blood picture, gives an unfavorable aspect to the case.

A moderate parallel ascent of the curves is of more favorable significance than a sudden, rapid ascent of one curve or the other, or a crossing of the curves. The most unfavorable cases are those of peritonitis with a very high neutrophilic blood picture, and a normal or subnormal leukocytosis. If after operation on such a case the neutrophile curve sinks and the leukocyte curve rises, the prognosis becomes better, the organism is overcoming the virulence of the infection.

After operation there is occasionally observed a rapid ascent of the neutrophile curve, sometimes accompanied with decrease in the leukocytosis, and shortly thereafter a return of the curve to the normal. This postoperative ascent, which is presumably dependent upon the stirring up of a previously encapsulated inflammatory process, is of no significance in regard to the prognosis.

A gradual steady rise of the neutrophilic blood picture after operation is an indication of great seriousness, as it signifies a progression of the infection.

Primary or secondary abscesses are indicated by an increase in the leukocytosis while temperature and pulse may remain normal. If the

leukocytosis decreases before the abscess is opened, it will, in all probability, be found encapsulated. With the increase in the leukocytosis there is usually, according to the degree of the infection, a more or less marked increase in the neutrophilic picture.

An early operation for appendicitis is indicated in all cases excepting those in which, in addition to a very mild clinical picture, especially slight local tenderness, the leukocytosis and neutrophilic blood picture are either normal or only slightly elevated. In case of recurrence, immediate operation is indicated.

If, in conjunction with slight clinical findings, there is a marked leukocytosis, operation should be undertaken.

A slight leukocytosis and a normal neutrophilic picture are no contra-indication to operation if the other clinical manifestations are of a definite nature, and especially if local tenderness is a prominent sign. Most of the cases conforming to this type are those in which the inflammation is retrocecal or otherwise extraperitoneal, and is limited to the region of the appendix.

An important contribution to the discussion of the most advantageous *period in which to operate* in an acute case of appendicitis is that by Ebner.<sup>1</sup> In tabulating the results of 611 operations for appendicitis performed in Lexer's clinic during the past five years, he lays especial stress upon the analysis of the results of operation in the intermediate as contrasted with the late stage of acute appendicitis. From the operative standpoint, he divides acute appendicitis into the following three stages: The early stage, within the first forty-eight hours; the intermediate stage, from the third to the eighth day; the late stage, from the ninth day on. In the intermediate stage, the appendix had to be left in the wound in 8.5 per cent. of the cases, as contrasted with 59.1 per cent. of cases in the late stage. Drainage had to be left in the wound in 23.7 per cent. of the intermediate cases, and 63.4 per cent. of the late cases. Disturbances in the postoperative course occurred in 12.7 per cent. of cases operated upon in the intermediate period, as compared with 26.1 per cent. of cases operated upon in the late period. Postoperative abscesses developed in 4.9 per cent. of the intermediate cases and 13.6 per cent. of the late cases. Pulmonary disturbances were noted in 4.9 per cent. of the intermediate cases, and 6.8 per cent. of the late cases. Finally, 45.6 per cent. of the patients operated upon in the intermediate stage left the hospital as cured within the first three weeks after operation, as contrasted with 21.4 per cent. of those operated upon in the late stage. The mortality, low in both groups of cases, was slightly lower in the cases operated upon in the intermediate stage than those operated upon in the late stage. Ebner thinks that this is sufficiently accounted for by the fact that the appendix could be

<sup>1</sup> Deutsches Archiv f. klin. Med., 1911, Band, ci, Heft 5 and 6, p. 498.

removed at the time of operation in 40.6 per cent. more cases of the intermediate period than the late period, and that 27.5 per cent. fewer cases had to be drained in the intermediate than in the late period; furthermore, as already stated, there were in the cases operated upon in the intermediate stage, fewer disturbances in the postoperative course, fewer postoperative abscesses, and fewer pulmonary complications than in the cases operated upon in the late period.

It must, of course, be recognized that these statistics of Ebner's concern only the relative advantages of operation in the intermediate and late periods, and that it is more or less generally recognized that the chances of operative success are considerably better in operations undertaken in the first stage than in either the intermediate or late stages. Paterson,<sup>1</sup> in pleading for early operation in an article upon the hidden dangers of appendicitis, states that the division of appendicitis into various clinical stages is quite unnecessary, for he believes that in all cases the operation should be performed as early as possible. He quotes a number of cases to illustrate the dangers of postponing operation, even in many cases in which the signs and symptoms seem to justify such a course. He believes that the local signs and general condition of the patient frequently give no indication whatever of the gravity of the condition within the abdomen.

One of the most serious complications of appendicitis is *multiple abscess of the liver*, which was discussed in PROGRESSIVE MEDICINE for June, 1911. A somewhat more unusual complication is the occurrence of a single abscess of the liver, 2 cases of which are reported by Bidwell.<sup>2</sup> Operation was performed in both cases, resulting in one case in recovery and the other in death.

In what practically constitutes a monograph upon the RELATIONSHIP OF PREGNANCY TO APPENDICITIS, Schmid<sup>3</sup> concludes as follows:

The occurrence of appendicitis during pregnancy is relatively frequent; approximately 2.5 per cent. of all women suffering with appendicitis are pregnant; approximately 1 per cent. of all pregnant women suffer with appendicitis.

Pregnancy does not seem to favor the occurrence of a first attack of appendicitis, but it does seem to favor recurrences; the causal relationship, therefore, is not clear.

Mild cases of appendicitis, as a rule, run the same course, with or without operation, in the pregnant woman as in the non-pregnant; more severe cases are unfavorably influenced by the termination of pregnancy through abortion or through normal birth.

When the peritoneum becomes involved in appendicitis, unless properly treated at once, pregnancy will, in the majority of cases, be

<sup>1</sup> Lancet, 1911, No. 4576, p. 1272.

<sup>2</sup> British Medical Journal, 1910, No. 2591, p. 507.

<sup>3</sup> Mitteilungen aus den Grenzgebieten d. Med. u. Chir., 1911, Band xxiii, Heft 2.



terminated; furthermore, appendicitis can favor disturbances of involution, adhesions, sterility, habitual abortion, extra-uterine pregnancy, and possibly also the vomiting of pregnancy.

The diagnosis of appendicitis during pregnancy or the puerperium is generally not easy.

The *prognosis* is, in general, unfavorable; the cause of this lies less in the existence of the pregnant state itself than, on the one hand, the tendency of the pregnancy to terminate in either birth or abortion, and, on the other hand, the frequency of late diagnosis with the consequent delay in the establishment of the proper treatment.

Only in the mildest cases, and when the patient can be kept under constant observation, should the expectant treatment be employed.

Under all other conditions *operation* should be recommended, especially early operation.

If operation cannot be performed in the early stage, it should be performed in the intermediate stage, instead of waiting for an interval operation, as is frequently the custom in the non-pregnant state.

The artificial interruption of pregnancy as the sole method of treatment should be discarded as an absolutely useless procedure.

If there are no signs of beginning labor present, the appendectomy should be performed as in non-pregnant states, except that the incision should be made as far lateral as possible, and the uterus should not be manipulated; after operation, the administration of opiates is indicated.

In the case of threatened interruption of pregnancy and in case of involvement of the peritoneum, after removal of the appendix and temporary closure of the abdomen, it is advisable to clean out the uterus by either forced dilatation or Cesarean section, and after completion of these procedures to introduce drainage into the peritoneal cavity.

In considering the various RELATIONSHIPS THAT MAY EXIST BETWEEN TYPHOID FEVER AND APPENDICITIS, Hesse<sup>1</sup> defines the following three conditions:

1. The chance occurrence of typhoid and appendicitis at the same time, though the two conditions cannot be brought into any etiological relationship with each other.

2. Inflammation of the appendix occurs as a direct consequence of the specific involvement by the typhoid infection of the lymphoid tissue of the appendix. This condition is probably best designated by the term "appendicitis typhosa."

3. Post-typhoidal inflammation of the appendix induced by stenosis or kinking of the appendix resulting from ulceration. This type may be designated as "appendicitis post-typhosa."

In the first group are those cases in which, during an attack of appen-

<sup>1</sup> Mitteilungen aus den Grenzgebieten d. Med. u. Chir., 1911, Band, xxii Heft 5.

ditis, typhoid fever occurs, and also those cases in which, during the course of typhoid fever, an intercurrent attack of appendicitis occurs. Of the two conditions, both of which are rare, the latter is the rarer.

In considering the second group, Hesse states that probably cases of this type not infrequently occur without permitting themselves to be recognized. The appendiceal inflammation in these cases need not necessarily be caused by the typhoid bacillus but may be caused by a number of other organisms which find the necrotic mucous and sub-mucous tissue of the appendix a suitable field for growth.

The third group of cases was originally designated "appendicitis paratyphoida" by Dieulafoy, but Hesse thinks the name "appendicitis post-typhosa" more suitable.

APPENDICITIS IN CHILDHOOD is apparently a much more frequent and more important condition than has in the past been recognized. H. C. Deaver,<sup>1</sup> on the analysis of a large series of operative cases, concludes as follows:

1. Appendicitis in childhood occurs with increasing frequency from birth to puberty, and is more common in males.

2. It runs a rapid and severe course in children more often than in adults. There is less tendency to the formation of strictures, but fecal concretions are more often found.

3. Enteric fever, intestinal catarrh, and influenza may predispose to appendicitis. Other infections or contagious diseases and nasopharyngeal troubles are hardly to be considered as etiological factors.

4. In infants, the symptoms of acute appendicitis are often scanty, irregular, and misleading. Infantile appendicitis is more frequent than is generally believed, or than statistics indicate. In older children, even more regularly than in adults, acute attacks occur suddenly and stormily. Chronic appendicitis represents a focus of chronic auto-toxemia, with all its attending evils.

5. All cases of abdominal trouble in children should be regarded as appendicitis until proved otherwise. Differential diagnosis must be made between appendicitis and intestinal catarrh or worms, right-sided pneumonia, or sacro-iliac disease, ovarian cyst twisted on its pedicle, mesenteric cysts, cystitis, and rectal abscess.

6. The prognosis in acute appendicitis is favorable if the case is received early and if the appendix is removed early. If the patient is operated upon within the first twenty-four hours, the mortality is practically *nil*. After this time the prognosis rapidly becomes worse. In chronic appendicitis, an acute attack with perforative appendicitis is always to be feared.

7. The result of this ideal in treatment is to maintain the mortality at *nil*. Early operation is the normal course to pursue.

<sup>1</sup> Journal of the American Medical Association, 1910, vol. lv, No. 26, p. 2198.

8. In intra-appendiceal appendicitis, the appendix with the entire disease tissue can be removed with nothing but benefit to the patient.

9. Non-operative treatment is indicated in cases of localizing abscess with diffuse peritonitis. Opium and purgatives are absolutely contra-indicated. Cathartics must never be given unless it is absolutely certain that appendicitis is absent.

10. Operation is even more suitable for children than for adults.

11. Postoperative treatment is highly important. The Fowler position must not be maintained for more than thirty-six hours in drainage cases, lest intestinal obstruction develop.

12. Intestinal obstruction is ushered in by sudden, severe pain, becoming paroxysmal, and by nausea, spitting up, and vomiting. Later symptoms arise in consequence of toxic peritonitis, the result of intestinal obstruction. The temperature and pulse are of but little significance in these cases. In the presence of numerous adhesions, ileocolostomy is the best procedure.

13. Secondary abscess must be carefully watched for. It is revealed by a rise and continued elevation of temperature with high leukocyte count and local signs.

14. Contagious diseases must be recognized at once.

15. Drainage is to be employed only when the exudate is purulent, or in large quantity. By its presence it produces adhesions and predisposes to intestinal obstruction. Glass tubes may be broken or plugged by omentum. Rubber tubes are valuable for their pliability. Gauze drains well at first, but later retards drainage. A wet dressing is the best for absorption.

**Carcinoma of Appendix.** Kennedy<sup>1</sup> reports 2 cases of carcinoma of the appendix. The first one was discovered in the microscopic examination of an appendix removed for what was supposed to be an acute attack of appendicitis. The photomicrograph accompanying the description of this case does not present the most convincing evidence of the carcinomatous nature of the specimen. The photomicrograph accompanying the description of the second case shows unmistakable evidence of carcinoma. The specimen was obtained at the autopsy on a woman who died of kidney and liver disease.

**Appendix Dyspepsia.** Appendix dyspepsia, or, as it has been called, "appendicular gastralgia," has come, within the year since its description, to be considered a condition of great importance. That the appendix may apparently be the sole cause of a train of severe and long-lasting gastric symptoms has been known to surgeons and clinicians the world over for many years, but to the English surgeons, who have written much upon the subject within the last two years, is due the credit for having emphasized the great importance and frequency of

<sup>1</sup> *Lancet*, 1910, No. 4555, p. 1757.



the condition. Maunsell,<sup>1</sup> writing upon this subject, gives the histories of 3 cases which are, I believe, sufficiently characteristic to justify their being quoted:

"Miss T. L., aged thirty years, first consulted Dr. L. on June 1, 1908. She had been suffering for three years from epigastric pain and vomiting. She was unable to eat solid food, and had existed upon 'slops.' Dr. L. could not elicit any definite history of hematemesis. Upon examination, the only obvious sign was tenderness upon pressure in the epigastrium slightly to the right of the midline.

"On June 10, the patient reported that she suffered from attacks of diarrhea. The epigastric pain was less, but there was severe pain in the back and much depression mentally.

"For the following fourteen months, in spite of various forms of treatment, her condition remained the same. In August, 1909, while in England, she suffered from a severe attack of abdominal pain, accompanied by tenderness in the right iliac fossa. During the next month Dr. L. saw her twice on account of severe abdominal pain in the right iliac fossa. The patient now entered the hospital, and I saw her with my colleague.

"Upon our first examination, nothing definite was found, but subsequently, when examining the pelvis, it was obvious that there was distinct tenderness upon pressure over the brim of the pelvis on the right side. We then determined to explore in the region of the appendix, and I removed a diseased appendix which lay inward toward the pelvic brim."

Maunsell states that this patient has never been troubled with the old symptoms since the operation, and is now a healthy and happy woman.

The second case is as follows:

"Mrs. D., aged thirty-six years, came to me on October 13, 1910, giving a history of epigastric pain and discomfort, and constant vomiting after meals for the last two years. She had not been able to eat any solid food, and subsisted upon milk and broths. She has had eight children, the youngest of whom is three years old. She had not menstruated for the last two years. She has suffered from obstinate constipation.

"There was considerable epigastric tenderness, also some tenderness upon deep pressure over the right iliac fossa. There was a slight amount of gastropnoia, and splashing could be elicited. There was no pelvic trouble of any consequence. Upon repeated careful questioning, I found that for the first eighteen months of her illness the attacks of vomiting and pain were often ushered in by pain and discomfort in the right iliac fossa, but that this had not been the case during the

<sup>1</sup> British Medical Journal, 1911, No. 2627, p. 1044.

past six months. A diseased appendix was removed, with the result that the patient experienced immediate and apparently permanent relief."

The third case is as follows:

"Miss S., aged forty years, came to me March 24, 1910, complaining of epigastric pain and vomiting, which usually occurred about two hours after taking food. She had been troubled in this manner for many years, and had lost flesh and was sallow and old-looking. In this case, also, I could elicit tenderness upon pressure over the right iliac fossa. By careful questioning, I found that two years previously she had to remain in bed for a few days on account of severe abdominal pain, accompanied by tenderness over the right iliac fossa.

"Upon opening this abdomen, I found a diseased and adherent appendix, together with numerous adhesions between the cecum and ascending colon and neighboring parts. The symptoms from which this patient suffered have completely disappeared."

Though it not infrequently happens that a newly described condition becomes the object of too much enthusiasm, and thus leads to erroneous diagnoses, there is no doubt that the appendix is of the greatest importance in the etiology of conditions, the symptoms and signs of which are limited almost exclusively to the stomach. The diagnosis of these cases is, however, extremely difficult. They resemble so much on the one hand the various gastric neuroses, especially those accompanied by hyperacidity, and, on the other hand, grave organic disease of the stomach, especially gastric ulcer, that the differential diagnosis becomes one of the greatest difficulty. This difficulty of diagnosis is expressed by Maunsell, aptly, though unrhethorically, when he defines appendicular dyspepsia as "a group of symptoms, and perhaps signs, which point so strongly to organic, gastric, or duodenal disease that it is only by most careful examination or by the super-vention of definite appendicular symptoms that a correct diagnosis is probable." He might almost have added that in some cases only by appendectomy and the subsequent disappearance of gastric symptoms can the diagnosis be established.

The treatment of appendicular dyspepsia differs so materially from that of the conditions which closely resemble it, that the importance of a correct diagnosis can be readily appreciated. On the one hand, there are the gastric neuroses, some of which may present symptoms indistinguishable from those of appendix dyspepsia. Undoubtedly patients with appendix dyspepsia have in the past been treated as gastric neurasthenics and failing to respond to treatment appropriate for the latter condition, have been added to that pitiable group of chronic gastric sufferers. And yet if the case be truly one of the gastric neuroses, the patient can only be harmed by a needless appendectomy. At the other extreme are the slightly atypical cases of gastric ulcer, which may

resemble appendix dyspepsia even, according to the English surgeons, to the hematemesis.

Considering all of these facts, I believe that the cautious attitude to take at present is to recommend for *appendectomy* the following three types of cases:

1. Those in which both gastric and appendicular symptoms are present, though neither typical, and in which, without the gastric symptoms, appendectomy may not be considered necessary.

2. Those in which there are persistent and more or less characteristic gastric symptoms together with distinct, if not prominent, signs of appendiceal disease. (The cases described by Maunsell and quoted above conform to this type.)

3. Those cases in which gastric symptoms, so profound as to make the patient's life miserable, have persisted for years, in spite of appropriate treatment, directed toward the local symptoms and the general neurasthenic state that is usually present in these cases, if, without definite signs of appendiceal disease, there can be any justification for the suspicion that the appendix could be the primary seat of the disturbance.

**Motility of the Colon.** Wakabayashi<sup>1</sup> after a series of experimental studies, concludes that:

The total isolation of the colon with the simultaneous production of an artificial anus interferes with the nutrition of dogs.

Saline laxatives given by the mouth in large doses and the administration of food have no influence upon the movements of the isolated colon.

Glycerin enemas produce movements in the intestines which propel the contents in both directions.

The introduction of moderately warm applications decreases the motility of the large intestine; cold substances, if applied but for a short time, stimulate the motor activities of the large intestine, whereas when allowed to act for a long time they paralyze them.

Small subcutaneous injections of morphine increase the movements in the large intestine, whereas larger doses decrease them.

Direct irritation of the mucous surface of the large intestine increase the motility at first strongly and later weakly.

The stimulation of peristalsis of the small intestine has no influence upon the peristalsis of the isolated large intestine.

**Intestinal Ferments.** Wakabayashi and Wohlgemuth<sup>2</sup> together studied the ferments in the intestinal secretion and concluded that:

The secretion of the large intestine as well as of the small contains

<sup>1</sup> Internat. Beiträge z. Path. u. Therap. d. Ernährungsstörungen, 1911, Band ii, Heft 4, p. 507.

<sup>2</sup> Ibid., p. 519.



*erepsin*, though in somewhat smaller quantities than the latter. No lab ferment could be found in the secretion of the small intestine.

The *proteolytic ferment* of the secretion of the small intestine is capable of splitting glycyl-tryptophan quicker than glycyl-tyrosin; the same holds true of the proteolytic ferment in the secretion of the large intestine.

*Lipase* is present in the secretion of the large intestine as in that of the small intestine, but its action is very weak.

The amount of *amylolytic ferment* in the secretion of both the small and large intestines is extremely small in comparison with the amount in the pancreatic juice.

Small amounts of *fibrin ferment* are found in the secretions of both the small and large intestines. The secretion of the small intestine possesses slight hemolytic properties.

**Intestinal Disinfection.** Hirata<sup>1</sup> considers that the production of a permanent lateral intestinal fistula is the most satisfactory method for studying the bacterial flora of the intestines at various levels. With this method he found that very satisfactory disinfection of the duodenum could be accomplished by the administration of salicylic acid, bismuth bisalicylate, creosote, salol, thymol, or resorcin. Calomel had no such action. No medicaments given by the mouth had any disinfectant action in the lower portion of the small intestines.

**Melanosis of the Large Intestine.** An exhaustive pathological study of melanosis of the mucous membrane of the large intestine is contributed by Pick.<sup>2</sup> The condition is one which in the past has received but little recognition, there being but one comprehensive article upon the subject, that of Solger,<sup>3</sup> who collected from the literature 5 cases and added 2 that had come under his own observation.

According to Pick, the condition is macroscopically and microscopically a well-defined affection, always limited to the large intestine. It begins on the colon side of the ileocecal valve and stops at the anus. It consists of a diffuse, dark brown or black pigmentation of the mucous membrane. In this dark brown or black background there may be seen delicate light lines forming a lattice-work design. The melanosis is always definitely limited to the mucous membrane. The other layers of the large intestine, the mucous membrane and other layers of small intestine, the lymphatic glands of the mesocolon, and the mesentery, and, in fact, all other organs of the body remain entirely free from pigmentation. Aside from the pigmentation, the mucosa of the large intestine remains entirely unaltered; there are neither ulcers, scars, nor evidences of inflammation. The name "colitis pigmentosa" is, therefore, not appropriate.

<sup>1</sup> Internat. Beiträge z. Path. u. Therap. d. Ernährungsstörungen, 1910, Band ii, Heft 27, p. 218.

<sup>2</sup> Berliner klin. Wochenschr., 1911, Nos. 19 and 20.

<sup>3</sup> Ueber Melanose der Dickdarmschleimhaut, Inaug. Dissert., Griefswald, 1898.

Microscopically, the pigmentation is seen to be limited to the fibrous tunica propria, the epithelium itself, and the lymphatic nodules being entirely free from pigmentation. The pigment is always amorphous, finely or coarsely granular, never diffuse or crystalline. It is usually seen in characteristic mononuclear pigment cells, sometimes exclusively intracellular, but usually partly extracellular on account of cell-disintegration.

Microchemically, the pigment is free from iron, whereas macrochemical investigation reveals both iron and sulphur. Microchemically it is altered by neither concentrated hydrochloric acid nor concentrated sulphuric acid, and does not turn black upon the addition of ammonium sulphate. In Pick's 6 cases the pigment could be definitely proved to be not of metallic origin, especially as far as mercury, bismuth, lead, or silver was concerned. It, moreover, presented the chemical characteristics which showed it to be not a derivative of blood-coloring matters, but to be a true melanin. Pick, therefore, believes that the condition deserves the term of melanosis, using this in its strict chemical significance.

Pick believes that the melanin is derived from the action of oxidative, tyrosin-like ferments contained in the connective-tissue cells of the mucosa upon aromatic decomposition products of albumin, such as indol and skatol. The ability to produce this ferment is apparently an individual peculiarity. The indol and skatol are transformed into melanin in the connective-tissue cells in the process of absorption. The puzzling limitation of the affection to the large intestine as well as to the connective-tissue cells of its mucosa is thus explained.

**Sensibility of the Gastro-intestinal Tract.** An extremely exhaustive study of the sensibility of the gastro-intestinal tract to all sorts of stimuli was undertaken by Hertz,<sup>1</sup> and the reports thereof are presented in the form of the Gulstonian lectures for 1911. The experiments were conducted so carefully, and such elaborate pains were taken to eliminate all possibilities of error, that I think an unusual amount of dependence can be placed upon them, and they may, in fact, be looked upon as almost the only reliable recent data that we possess upon the subject with which they deal. It is impossible to describe each experiment in this article, and we must content ourselves with a consideration of the results of the experiments. These are as follows:

The mucous membrane of the alimentary canal from the upper end of the esophagus to the junction of the rectum with the anal canal is insensitive to tactile stimulation.

The mucous membrane of the esophagus and the anal canal is sensitive to thermal stimulation, but that of the stomach and intestines is insensitive.

<sup>1</sup> *Lancet*, 1911, Nos. 4573, 4574, and 4575.

The mucous membrane of the esophagus and stomach is insensitive to stimulation by dilute hydrochloric acid and dilute organic acids, and the rectum, but not the anal canal, is insensitive to stimulation by glycerin. Contact of alcohol with the mucous membrane of all parts of the alimentary canal gives rise to a sensation of heat.

The surface of gastric and intestinal ulcers is no more sensitive to tactile, thermal, and chemical stimulation than the intact mucous membrane.

The sensation of fulness in the alimentary canal is due to a slow increase in the tension exerted on the fibers of its muscular coat; the adequate tension is constant for each segment, but the volume of contents necessary to produce this tension varies with the tone of the muscle fibers.

The sense of fulness in the rectum has a special character, by virtue of which it produces the call to defecation.

Hunger consists in a general sensation of malaise and weakness in the body as a whole, and a local sensation of emptiness in the abdomen. The latter is due to the periodical motor activity of the stomach and intestines during fasting, when the sensory nerves are in a condition of hyperexcitability.

The only immediate cause of true visceral pain is tension; this is exerted on the muscular coat of hollow organs and on the fibrous capsule of solid organs. The sensation of pain in the alimentary canal is due to a more rapid or greater increase in tension on the fibers of its muscular coat than that which constitutes the adequate stimulus for the sensation of fulness.

Pain in diseases of the alimentary canal is most frequently true visceral pain; it is sometimes due to spread of the disease to surrounding sensitive structures or to tension exerted on the peritoneal connections; and lastly, it may be situated in the skin, muscles, and connective tissues, to which it is referred from the segment of the central nervous system which receives the afferent nerves from the affected organ.

Tenderness in diseases of the alimentary canal is most frequently due to hyperalgesia of the skin, voluntary muscles, and connective tissues supplied by the segment of the central nervous system, which receives the afferent nerves from the affected organ. It may also be due to increase in tension within the organ produced by the external pressure giving rise to the adequate stimulus of visceral pain; this is rare in the stomach, but comparatively common in spasmodic conditions of the colon and in appendicitis. Lastly, it may be due to the spread of the disease to the parietal peritoneum.

Visceral sensibility is exaggerated by training in hypochondriasis, and visceral and referred sensations are exaggerated by the irritable condition of the central nervous system in neurasthenia and anemia.

Many of these conclusions to which Hertz comes are rather sur-



prising, and compel us to materially alter our previous conceptions concerning gastro-intestinal pain. It must be remembered, however, that most of these conceptions were based upon hypotheses which were purely the result of more or less exact clinical observation, and not upon accurate experimental investigation. Two of the most interesting findings of Hertz are that the mucous membrane of the stomach and esophagus is insensitive to stimulation by weak hydrochloric acid and dilute organic acids, and that the surface of gastric and intestinal ulcers is no more sensitive to tactile, thermal, and chemical stimulation than the intact mucous membrane. These results compel us to believe that the pain in gastric and duodenal ulcer, as well as in hyperchlorhydria and acute indigestion, with the presence of organic acids, is due primarily to the pyloric spasm induced by the acidity in these conditions. This, of course, is not an unnatural conclusion when we consider the role that gastric acidity plays in the normal pyloric mechanism, and what we would naturally conclude to be the effect of hyperacidity upon this mechanism. It is, furthermore, interesting to note that Hertz believes that the pain in acute indigestion may be due to the spasm induced by the attempt of the stomach to rid itself of hard, dense particles of food.

**Digestion of Vegetables.** Prefacing his remarks with the statement that the digestion of vegetables has been a much neglected subject in gastro-intestinal medicine, Schmidt<sup>1</sup> presents the results of his observations and experiments upon this subject. It has usually been considered that the most important agent in the digestion of the cellulose envelope of vegetables is the bacteria of the intestines. Schmidt finds, however, that the gastric juice, especially the hydrochloric acid, plays an extremely important part in the preparation of vegetables for further digestion in the gastro-intestinal tract, doing so by acting upon the cellulose, making this, as it were, much more readily soluble. It does so, however, not entirely by itself, but only when, subsequent to being acted upon by the acid gastric juice, the vegetables come into contact with the alkaline duodenal juices. Experiments led Schmidt to believe that this action is a purely chemical one, and that the same results may be obtained by treating vegetables outside the body, first with acid and subsequently with alkalis. He, at present, has experiments under way to make these observations of practical usage in the preparation of vegetables as foodstuffs. Schmidt believes that this discovery of the importance of hydrochloric acid in the digestion of the cellulose explains the relationship of constipation to hyperchlorhydria; the cellulose becomes digested to a greater extent than it should, thus decreasing the bulk of the feces.

<sup>1</sup> Deutsche med. Wochenschr., 1911, No. 10, p. 435.

**Bacteria in Gastro-intestinal Disease.** Dawson<sup>1</sup> has undertaken to solve that very intricate and difficult subject of the relationship of bacteria, existing in the alimentary tract, to the diseases localized in that tract. In the stomach Dawson finds that one of three conditions may exist:

1. The contents are quite or almost sterile. This is the condition of the healthy stomach ten to twelve hours after a meal. It is also the condition often found in cases of ulcer.

2. Some organism like a diplococcus or streptococcus is found in great predominance, sometimes almost pure.

3. A medley of organisms is found, denoting a stomach of low resistance, but not necessarily associated with any clearly defined group of symptoms. Dawson finds that pathogenic organisms exist in the stomach frequently in spite of the hydrochloric acid being normal or in excess. However, that these organisms have actual foothold and are not mere incidental importations is more difficult to establish.

Dawson investigated the bacterial content of various portions of the digestive tract, establishing more or less convincing proof of the relationship of the organisms to diseases of the parts in which they were found. The upper and lower portions of the alimentary tract harbor so many pathogenic and non-pathogenic organisms that we must be extremely cautious in identifying organisms found in these portions with the diseases to which they are subject. The results of the bacteriological study of the middle portions of the alimentary tract can be looked upon as somewhat more significant. Dawson's finding of the normal sterility of the stomach ten or twelve hours after a meal is very interesting, as is also his finding that the stomach contents are sterile in most cases of ulcer of the stomach. This should be of interest to those who have persistently contended that gastric ulcer is the result of local infection. It is also of great interest to note that Dawson found that pathogenic organisms may exist in the stomach in spite of a normal or even excessive hydrochloric acid content.

Dawson suggests that the cures of gastric disturbances sometimes following the removal of a more or less diseased appendix may be dependent upon the fact that with the removal of the appendix we remove a focus of infection which affected the stomach as well as other portions of the gastro-intestinal tract. A rather interesting, if not convincing case, is one reported by Dawson, in which the patient complaining of vague gastro-intestinal symptoms was cured by the injection of a vaccine made from bacteria obtained from the coated tongue that the patient presented.

**Gastro-intestinal Auscultation.** Glücksmann<sup>2</sup> dilates at great length upon the diagnostic importance of studying the sounds that occur in

<sup>1</sup> Lancet, 1911, No. 4574, p. 1124.

<sup>2</sup> Deutsche med. Wochenschr., 1911, No. 13, p. 590.

the gastro-intestinal tract, and especially at the pylorus after the administration of food. In his studies he paid no attention to the variations in character of the sounds, but only to the number of them that occurred during periods of equal length after the taking of food. The method consists in auscultating with a stethoscope over the pylorus for an hour to an hour and a half, and registering the number of sounds that occur in each period of five minutes' duration. The method, as is seen, consumes an extraordinary amount of time, and, so far as I can see, contributes no information of any diagnostic significance that could not be obtained by more reliable and more rapid methods.

Glücksman states that the sounds his investigation deals with were first described by Obrastzow, and later by P. Cohnheim. Meltzer<sup>1</sup> calls attention to the fact that he<sup>2</sup> described these sounds in 1884, and eighteen years afterward Obrastzow<sup>3</sup> first noted their occurrence.

**Abdominal Symptoms in Thoracic Disease.** It is well to remember, in considering the diagnosis of obscure, acute abdominal disease, that thoracic diseases may simulate, in almost every particular, disease of the abdominal viscera. Edwards,<sup>4</sup> after a clinical study of these facts, concludes that:

1. Pneumonia, pleurisy, and pericarditis, at their very onset, may present absolutely no symptoms other than the abdominal findings.
2. These phenomena of invasion may completely resemble appendicitis, peritonitis of other etiology, or even the collapse of perforation.
3. Diagnostic errors and unnecessary operations may be unavoidable. Immediate operation is imperative, and the small percentage of error is negligible in comparison with the benefits of early operation in genuine indications (particularly as 80 per cent. of patients operated on under a mistaken diagnosis recover).
4. The tenderness does not always remit with deep, flat pressure, and that relaxation of the abdominal parietes, between respirations, is not invariable.
5. The general symptoms do not invariably overshadow the local, the latter at times being the more salient.

**Gastro-intestinal Hemorrhage.** Kelling<sup>5</sup> discusses the various mechanical means that may be adopted to control hemorrhage in the gastro-intestinal tract. The simplest means of compression that can be exerted, in the case of hemorrhage from the stomach, is direct manual compression exerted through the anterior abdominal wall. Kelling employed this method in the case of a woman who was having persistent hematemesis and in whom a small mass could be felt just below the left costal

<sup>1</sup> Deutsche med. Wochenschr., 1911, No. 21, p. 987.

<sup>2</sup> Berliner klin. Wochenschr., 1884, No. 30.

<sup>3</sup> Deutsche med. Wochenschr., 1902, p. 771.

<sup>4</sup> Journal of the American Medical Association, 1911, vol. lvi, No. 24, p. 1784.

<sup>5</sup> Münchener med. Wochenschr., 1910, No. 51, p. 2690.



margin. The procedure was apparently of service in this instance, as the hemorrhage ceased. Instead of the hand, a pad can be used and held in the proper place with more or less pressure. Kelling states that this is especially applicable in cases of gastropnoxis, especially in those cases in which there is a lax abdominal wall. The pylorus itself can be compressed and closed by pressure, either manual or instrumental, applied slightly toward the median line from the right costal margin.

The cardia can also be closed by a relatively simple yet quite efficient procedure. Over the lower end of a stomach tube is tied a small, thin, rubber balloon or finger cot. The stomach tube is introduced until the lower end is within the stomach; the balloon is then inflated; as the tube is then partly withdrawn, the balloon makes pressure upon the cardia. There is but one danger incident to the application of this procedure, when the pylorus also is compressed; it is possible to conceive of the increased intragastric pressure caused by the collection of blood in the stomach, inducing perforation of the ulcer. According to Kelling, however, this is a very remote danger, for the blood pressure is usually very low in patients undergoing gastric hemorrhage, and ulcers which bleed sufficiently to endanger life are usually adherent to neighboring organs, and have thick callous borders which would resist a great deal of pressure without giving way. However, there is always the possibility of the existence of additional ulcers, and the possibility of inducing perforation in one of these must be kept in mind. Kelling states that if a patient is so situated that he can be operated upon without entailing too much motion and discomfort, operation should be recommended. But, in cases in which surgical assistance cannot be readily obtained, he thinks that the method described above is worthy of employment, especially in those cases in which the hemorrhage seems to be endangering life.

A condition in which Kelling states that the method of compressing the cardia which he describes is of the greatest service is in the hemorrhage from varicose veins at the lower end of the esophagus in cases of atrophic cirrhosis of the liver.

In addition to the measures described, Kelling employs whatever other means seem indicated or serviceable. He gives powdered chalk in milk, by the mouth, and, according to recommendations of Van der Velden, employs frequently repeated intravenous injections of 5 c.c. of a 5 per cent. solution of sodium chloride. By this means the coagulability of the blood is increased for from thirty to fifty minutes. He sees no benefit to be derived from the use of adrenalin.

A more elaborate procedure, which Kelling<sup>1</sup> first recommended a number of years ago as a result of animal experimentation, consists in the injection of sterile air into the peritoneal cavity by means of a cannula, or, better, oxygen, with the intention of raising the intra-abdominal

<sup>1</sup> Münchener med. Wochenschr., 1901, Nos. 38 and 39.

pressure sufficiently to cause cessation of the hemorrhage. This he also used in several instances, apparently with success. This procedure is one requiring considerable technical skill as well as appropriate apparatus, and is altogether one which is scarcely applicable for emergency use outside of a hospital. Kelling thinks, however, that the same results can be obtained by a much simpler procedure— inflation of the colon. A rectal tube is introduced, and the colon distended by means of a rubber bulb; the degree of distention is controlled by the patient's sensation and by percussion. A sand bag can also be placed upon the abdomen. According to Kelling, it is best to leave the rectal tube in place, so that as the intra-abdominal pressure decreases, more air can be introduced. This method was used in three cases with excellent success.

These procedures described by Kelling may be of great value, but, of course, that can be determined only by repeated trials. In this connection the excellent results of lavage in hemorrhage from ulcer, as claimed by Kaufmann and considered in *PROGRESSIVE MEDICINE* for December, 1910, must not be forgotten.

**Phenolphthalin Test for Occult Blood.** Boas<sup>1</sup> looks upon the phenolphthalin test for the detection of occult blood as a very reliable and useful one. As regards its delicacy, it stands about midway between the guaiac test and the benzidin test. Its greatest advantage lies in the ease with which the necessary reagents can be prepared and maintained, and the great distinctness of the color reaction, so that even differences in amounts of blood can be estimated. In a comparison of the delicacy of the three tests, Boas found the guaiac test positive when blood was present in the proportions of 1 to 10,000, the phenolphthalin test positive in dilutions of 1 to 40,000, whereas the benzidin test still reacted when blood was present in the proportions of 1 to 80,000.

The phenolphthalin solution is prepared by adding 2 grams of phenolphthalin, 20 grams of potassium hydroxide, and 10 grams of powdered zinc to 100 c.c. of water. The resulting red mixture is constantly shaken and gently heated over a small flame until perfectly colorless, and, while still hot, is filtered. The test is performed as follows: A small mass of feces is rubbed up with water until a thin, watery mixture results; a small amount of acetic acid is added, the mixture shaken, and then ether added; this mixture is slowly shaken in a test-tube, the ether poured off into a clean test-tube, and to it about 20 drops of the phenolphthalin solution added; this mixture is again shaken, and to it is added 3 or 4 drops of hydrogen peroxide. If blood is present the phenolphthalin is thus oxydized to phenolphthalein, which manifests itself according to the amount of blood present by a light rose to a deep rose-red color. If much blood is present, the color will persist for some time; if but little is present, the color will rapidly fade. Boas found, further, that if much blood is present the rose-red color will

<sup>1</sup> *Deutsche med. Wochenschr.*, 1911, No. 2, p. 62.

appear without the addition of hydrogen peroxide; but if little is present, it will appear only after the latter is added.

**Relation of Ulcer to Carcinoma in the Alimentary Tract.** Wilson and Willis<sup>1</sup> have made a statistical study of the relationship of ulcer to carcinoma of the various portions of the alimentary tract, based upon the histological study of the enormous amount of material at their disposal in the clinic of the Mayo brothers. The material upon which their study is based consisted of 167 cancers of the lip, 46 cancers of the mouth and tongue, 2 cancers of the esophagus, 189 cancers of the stomach, 15 cancers of the gall-bladder, 22 cancers of the appendix, 20 cancers of the cecum, 42 cancers of the remainder of the colon, and 67 cancers of the rectum, making in all 570 cases of cancer of various portions of the alimentary tract.

Wilson and Willis were led by their studies to believe that the importance of ulcer in the pathogenesis of cancer lies in its tendency to produce small segregated islands of epithelial tissue which subsequently show the tendency to irregular proliferation. These small segregated masses of epithelial cells are common in diverticula, and are found about the margins of almost all ulcers of the alimentary tract. They are caused by the growth of connective tissue which occurs as a manifestation of the tendency to healing. That these islands do not lead to irregular cell proliferation in the majority of instances is due, according to Wilson and Willis, to the fact that they undergo death as a result of disturbances of their blood supply.

In the carcinomas studied, Wilson and Willis found evidences of this isolation of epithelial cells on the basis of previous ulceration in 67 per cent. of the cases of cancer of the stomach, 33 per cent. of the cases of cancer of the gall-bladder, 100 per cent. of the cases of cancer of the appendix, 10 per cent. of the cases of cancer of the cecum, 40 per cent. of the cases of cancer of the colon, and 3 per cent. of the cases of cancer of the rectum.

The authors conclude that:

The relationship of simple, chronic irritation of the unbroken free surface of the mucosa of the alimentary canal to cancer, as indicated by clinical data, is not readily demonstrable pathologically. Scar tissue at the bases of ulcers, obliterations of the lumina of appendices and diverticula, segregate portions of mucous epithelium from the neighboring epithelium and from the lumen of the alimentary canal. These portions of segregated mucous epithelium tend (a) to degenerate from pressure and diminished blood-supply, or (b) to proliferate and infiltrate the surrounding tissues, thus forming cancer. The islands of segregated epithelium probably should be regarded as points of least resistance only, and requiring the presence of other factors for the production of carcinomata.

<sup>1</sup> Journal of the American Medical Association, 1910, vol. iv, No. 11, p. 921.



## THE PERITONEUM

**Intra-abdominal Pressure.** Two articles have appeared within the last year on the measurement and significance of the intra-abdominal pressure, or, to be more exact, the pressure in the peritoneal sac. One of these is by Emerson,<sup>1</sup> the other by Engelen.<sup>2</sup> In his determinations, Engelen uses a small apparatus that he has constructed, and which in its application requires only to be placed upon the anterior abdominal wall. Emerson introduces a cannula into the peritoneal cavity; the peripheral end of the cannula is attached, by means of rubber tubing, to a manometer, upon which the readings are made.

According to both authors, intra-abdominal pressure is but slightly above atmospheric pressure. Decreased intra-abdominal pressure which finds its clinical expression in general visceroptosis is, of course, a well-known condition, but both Emerson and Engelen believe that conditions accompanied by an increased intra-abdominal pressure have not been accorded the attention they deserve. According to Engelen, increased abdominal pressure hinders the ease of movement of the diaphragm, thus leading to a decrease in the depth of the respiratory movements, which, in its turn, puts more work upon the heart, thus leading to cardiac insufficiency.

Emerson concludes that increased intra-abdominal pressure may seriously embarrass both respiration and cardiac action, and that this may be an important factor in the emergencies of the acute infections accompanied by abdominal distention. He believes that the normal intra-abdominal pressure is an aid to the return of venous blood to the thorax, and that it is also a factor to the flow of chyle from the abdomen to the thorax. He contends, also, that decreased intra-abdominal pressure may be of importance in causing more or less severe dyspnea, for in this condition expiration is not assisted by an important factor in its mechanism, the pressure against which the diaphragm must contract in inspiration, and which insures a prompt recoil in expiration.

After writing the above I came across an additional article on the same subject, entitled "High Position of the Diaphragm (Zwerchfell-hochstand) and the Circulation," by Jürgensen.<sup>3</sup> The author calls attention to the frequency with which he has found an interesting group of symptoms in persons seeking treatment in Dapper's Sanatorium for obesity or chronic gastro-intestinal disturbances associated with abdominal distention. These phenomena are an unusually high position of the diaphragm, which Jürgensen attributes to increased intra-abdominal pressure, an extreme shallowness of the thoracic excursion

<sup>1</sup> Archives of Internal Medicine, 1911, vol. vii, No. 6, p. 754.

<sup>2</sup> Deutsche med. Wochenschr., 1911, No. 19, p. 871.

<sup>3</sup> Archiv f. Verdauungskrankheiten, 1910, Band xvi, Heft 4, p. 419.

in breathing, a displacement of the apex beat to the left, increased blood pressure, and occasionally a difference in blood pressure on the two sides. These alterations in blood pressure, as well as the displacement of the apex beat to the left, Jürgensen attributes to the very deficient breathing, which in turn is due to the high position of the diaphragm, resulting from the increased intra-abdominal pressure.

**Diaphragmatic Hernia.** Two cases of congenital diaphragmatic hernia are reported by Scholz,<sup>1</sup> who discusses the varieties and nature of congenital anomalies of the diaphragm. These may be of three varieties: (1) True diaphragmatic hernia, in which there is a hernial sac of peritoneum; (2) hernia spuria, in which there is no hernial sac; and (3) a simple bulging of the diaphragm, sometimes spoken of as eventration, but, according to Scholz, better described as congenital high diaphragm. Diaphragmatic hernia may originate in one of three ways:

1. The muscle fibers of the diaphragm become separated at some points, and a *locus minoris resistentiæ* results.
2. A similar phenomenon occurs at one of the normal openings in the diaphragm, for instance, the hiatus aorticus.
3. There may be a congenital defect consisting of a failure of development at the muscle of the diaphragm at some point.

**Peritonitis.** PERITONITIS FROM PERFORATED GALL-BLADDER. Peritonitis resulting from perforation of the gall-bladder bears the reputation of being an extremely serious condition and having an extraordinarily high mortality. This seems to be borne out by the statistics on the subject. Nötzel, in the German Surgical Congress of 1909, reported 11 cases, of which 6 died. Körte operated on 9 cases, of which 7 died. Nordmann saw 2 recoveries in 4 operative cases, whereas all of Hirschel's 7 patients died. Bertelsmann<sup>2</sup> cannot understand why such a high death rate has attended these cases, and reports 3 in which he himself operated, all 3 of the patients making complete recoveries.

**BILIARY PERITONITIS WITHOUT PERFORATION.** An extremely interesting condition, biliary peritonitis without perforation of any portion of the bile channels, is reported by Clairmont and von Haberer.<sup>3</sup> Their report is based upon one operative case which subsequently came to autopsy. There was nothing unusual about the case, excepting for the deeply bile-stained serous exudate and the pigmentation of the peritoneum. After observing this case, however, the authors recalled that in a series of experiments on dogs to determine the effect of complete occlusion of the common bile duct on the kidney functions, they observed exactly the same phenomena in 4 dogs. In each of the animals death occurred with the symptoms of peritonitis, and at autopsy nothing was found but an extensive bile-stained exudate and deep biliary pigmentation of the

<sup>1</sup> Berliner klin. Wochenschr., 1911, No. 8, p. 339.

<sup>2</sup> Deutsche med. Wochenschr., 1911, No. 24, p. 1114.

<sup>3</sup> Mitteilungen aus den Grenzgebieten d. Med. u. Chir., 1910, Band xxii, Heft 1.

peritoneal tissues. Neighboring tissues, such as those of the thorax, were entirely free from pigmentation. The authors are quite at a loss to explain these remarkable phenomena.

**GOXORRHEAL PERITONITIS IN THE MALE.** Bodenstein<sup>1</sup> reports rather an unusual condition—peritonitis in the male resulting from gonorrhea.

**TUBERCULOUS PERITONITIS.** Cassel,<sup>2</sup> who has had great experience in the treatment of tuberculous peritonitis in children, is inclined to the belief that appropriate medical treatment is, in general, preferable to surgical treatment, and recommends the latter only when satisfactory medical treatment cannot be employed or has been employed, and has failed to produce the desired result.

**ADRENALIN TREATMENT OF PERITONITIS.** In an analysis of the adrenalin treatment of peritonitis, Holzbach<sup>3</sup> can find no other cause for its apparent serviceability than the properties of the drug in supporting a failing blood pressure.

**Ruptured Hydatid Cyst.** Barling and Welsh<sup>4</sup> report several cases of ruptured hydatid cyst into the peritoneal cavity, and note that this condition presents a definite and distinctive symptom complex, the main points of which are eosinophilia, the presence of free fluid in the abdominal cavity, and the appearance of urticaria.

## THE LIVER

**Liver in Fat Necrosis.** Some very interesting experimental observations on the influence of fat necrosis on animals with an Eck fistula were made by Fischler.<sup>5</sup> He found that in animals with an Eck fistula a very slight degree of fat necrosis was capable of producing death, which occurred with the clinical manifestations of coma, occasionally combined with cerebral irritative symptoms. Pathologically, the liver in all of these cases showed a high degree of centro-acinous degeneration, necrosis, and atrophy. Under these conditions Fischler believes that we must assume an enormous decrease in the resistant powers of the liver, which is probably dependent upon the uncontrolled influence of the liberated pancreas ferments on it. That fermentative processes actually are present is proved by the existence of fatty acid components in the necrotic areas, resulting from the action of steapsin. The author believes that the influence of pancreatic fat necrosis on the normal liver has in the past been underestimated, for in all such cases degenerative conditions of the liver can be found. He believes that a com-

<sup>1</sup> Münchener med. Wochenschr., 1910, No. 36, p. 1886.

<sup>2</sup> Berliner klin. Wochenschr., 1911, No. 19, p. 832.

<sup>3</sup> Münchener med. Wochenschr., 1911, No. 21, p. 1122.

<sup>4</sup> Lancet, 1910, No. 4544, p. 1001.

<sup>5</sup> Deutsches Archiv f. klin. Med., 1910. Band c, Heft 3 and 4, p. 329.



parison of the course of the fat necrosis in the normal and in the altered liver gives to the latter organ a hitherto unrecognized role—that of destroying ferments.

**Tests of Liver Function.** An exhaustive study of the various methods of estimating the functional capacity of the liver led Frey<sup>1</sup> to conclude that urobilinuria is of common occurrence in liver diseases, but indicates the existence of a functionally diseased organ only when a diminution in the amount of fecal urobilin and an increased administration of urobilin building material can be excluded.

Levulose is useful in the recognition of liver affections; alimentary levulosuria is observed in about 10 per cent. of all individuals, and in about 50 per cent. of individuals with liver disease. It is of especial significance in cirrhosis of the liver, but may be absent even in this condition. The amount of urea excreted in the urine is no indicator of the existence of liver disease. The ammonia values are high in liver diseases, and especially high in cirrhosis; however, the diagnostic significance of this phenomenon is lessened by the occurrence of similar findings in excessive meat eating, in fever, and various diseases accompanied by acidosis. Frey believes that one of the most important means of functional diagnosis of liver diseases exists in the estimation of the amino-acids; these he finds regularly increased (over 0.5 gm. of N) in cirrhosis. The significance of this finding is all the more increased by reason of the fact that he obtained the same result in but two non-cirrhotic cases of liver disease, one a case of amyloidosis, the other a case of extensive, chronic, passive congestion. In other than liver diseases, he found the same condition in pneumonia, typhoid, and pancreas diabetes.

**Influence of Infections on Liver Functions.** Schmidt<sup>2</sup> made some clinical investigations upon the influence that infectious diseases have upon the methods employed in estimating the functional capacity of the liver. He found that infectious diseases or the presence of toxins in the body cause a diminution in the tolerance for levulose, a decrease in the glycogen-content of the liver after the administration of glycogen, and urobilinuria. Simple high temperature without infection in animals produces no diminution in the tolerance for levulose. These phenomena in infectious diseases are in great part due simply to the disturbances of nutrition caused by the infection. Schmidt believes that the test for levulose and the presence of urobilinuria are of significance in the diagnosis of liver diseases only when no infectious disease simultaneously exists.

**Syphilis of the Liver.** Edwards,<sup>3</sup> writing on syphilis of the liver, makes the following classification, together with notes and comments:

<sup>1</sup> *Zeitschr. f. klin. Med.*, 1911, Band lxxii, Heft 5 and 6, p. 383.

<sup>2</sup> *Deutsches Archiv f. klin. Med.*, 1910, Band c, Heft 3 and 4, p. 369.

<sup>3</sup> *American Journal of the Medical Sciences*, 1910, No. 463, p. 527.

A. Typical and particularly aberrant types of syphilis of the liver.

1. Hepatic gummas resembling cancer of the liver. In the differential diagnosis of these two conditions the following points should be considered:

(a) Age is not a very reliable criterion, but it is commonly asserted that syphilis is prone to develop in those under forty years of age, whereas cancer prevails largely in later life.

(b) It is maintained that in syphilis the tumors are generally smaller than in cancer, but gummas may so distend the liver that the organ occupies most of the abdominal cavity. In one very emaciated patient an epigastric swelling, larger than the patient's head, subsided under mercury and iodides, which therapy was suggested by the Argyll-Robertson pupils. These luetic tumors generally develop more slowly than cancer, at least after they are once detected; they remain more stationary, and compression symptoms, as crowding of the enlarged liver upon the lungs and other structures, are more suggestive of cancer than of syphilis.

(c) The edge of the liver in syphilis is rather smooth, or its anterior surface near the suspensory ligament and near its palpable edge is lobulated by deep, radiating furrows resulting from cicatrization and organization of the gummas.

(d) It has been claimed that the absence of ascites speaks rather more for syphilis than for cancer; though this dictum doubtless holds for most cases, it is not an absolute criterion.

(e) Splenic enlargement is uncommon in syphilis unless the portal vein be compressed by a gumma or the spleen itself be the seat of amyloidosis or gumma formation.

(f) Pain on movement, pain in the right shoulder, and tenderness over the liver almost invariably indicate perihepatitis, and therefore suggest syphilis rather than cancer. If the perihepatitis is recent, a friction rub may be heard over the liver; if it is old, adhesions to the colon or stomach and abolition of the respiratory excursion of the liver may result.

(g) In hepatic syphilis, emaciation may attain such an extreme degree of development that carcinomatous cachexia is diagnosed without hesitation. Emaciation and cachexia are, therefore, symptoms that cannot be greatly relied upon in the differential diagnosis.

2. Syphilitic cirrhosis resembling alcoholic cirrhosis. There is no absolute criterion for differentiation between syphilitic and portal cirrhosis. In syphilitic cirrhosis, the size of the liver is more commonly increased than decreased, even though the process is destructive rather than hyperplastic. The new-formed connective tissue follows the portal vein and its ramifications into the liver substance, the lobules of which are more invaded than in alcoholic cirrhosis. The surface of the liver is uneven, and its edge is somewhat sharper than in the ordinary form of cirrhosis. Perihepatitis is common, and results in various adhesions.

Icterus occurs in one-third of the cases, and the attendant enlargement of the spleen develops from stasis, toxemia, or amyloid degeneration. Ascites is less common than in the alcoholic variety, develops later, and is prone to recur after tapping. A longer clinical course and fairly good nutrition are said to be characteristic, but there are many exceptions.

3. Gummatous hepatitis resembling gallstones. This is a condition to which Riedel<sup>1</sup> has particularly called attention. The condition may resemble cholelithiasis in every detail.

B. Fever in visceral lues, particularly in hepatic localizations. Fever in syphilis of the liver has been written of by various observers since Werlhof first called attention to it in 1732.

C. The mimicry of toxemic and septicopyemic conditions by syphilis of the liver.

1. Hepatic gummas resembling abscess of the liver. The resemblance to abscess of the liver may be great even to minute details in symptomatology. Leukocytosis was present in a number of instances, in one as high as 21,000.

2. Gummas of the liver simulating tuberculosis, typhoid fever, septicopyemia, malaria, etc. In the absence of any localizing visceral symptoms, fever alone may prove most deceptive.

3. The prolonged pyrexia of pylephlebitis. The author in his article reports a case which he considers to be of this type.

The credit of first having called due attention to the occurrence of *tertiary febrile syphilis of the liver* is given to Klemperer.<sup>2</sup> He reported a number of cases and considered the condition pathologically to be due to ulcerating gummas of the liver. None of his cases, however, were confirmed by autopsy or operation. Subsequently, cases were reported by other observers, and one of these<sup>3</sup> was found at operation to be of the nature of a gummatous liver disease. Edwards, in the article mentioned above, reports a case of febrile liver syphilis which he thinks was of the nature of a syphilitic pylephlebitis. As with many other cases that have appeared in the literature, the most convincing evidence of the syphilitic nature of Edwards' case was the response to anti-syphilitic treatment.

Two extremely interesting cases in connection with this subject are reported by Kirchheim.<sup>4</sup> Both cases were carefully observed clinically, and subsequently came to postmortem examination. In both cases there were multiple gummas on the upper surface of the liver, which involved also the diaphragm. From the diaphragm, which in one case was perforated, the process extended to the lung, in the one case inducing a pneumonia of the right lower lobe, in the other causing a more chronic inflammation with the formation of a circum-

<sup>1</sup> Mitteilungen aus den Grenzgebieten d. Med. u. Chir., 1904, Band xiv, Heft 1.

<sup>2</sup> Therapie der Gegenwart, 1903 and 1904.

<sup>3</sup> Deutsche med. Wochenschr., 1904, No. 14.

<sup>4</sup> Ibid., 1911, No. 4, p. 152.



scribed basal empyema. Kirchheim believes that secondary infections were important factors in the course of both of these cases; in one of them, in fact, staphylococci were isolated from the gumma. He ventures the opinion that in many of the cases of febrile syphilis of the liver reported, secondary infections may be the agents responsible for the febrile course of the disease.

**Etiology of Atrophic Cirrhosis of the Liver.** The view that alcohol is of secondary importance as an etiological factor in the type of cirrhosis of the liver which is usually designated as alcoholic or atrophic is not new. This view has probably never been quite so vigorously defended as it is at the present time by Klopstock.<sup>1</sup> In three recent articles he expresses his reasons for contending that atrophic cirrhosis is, in the majority of instances, the result of a chronic infection which is probably not of a specific nature. He finds substantiation for his view in the fact which has been emphasized by von Hansemann, that though a relatively large percentage of persons suffering with atrophic cirrhosis use alcohol to excess, but a relatively small percentage of those using alcohol to excess suffer with atrophic cirrhosis. He believes, furthermore, that none of the animal experiments have indicated any definite relationship between alcohol and cirrhosis of the liver. Of course, there can be no doubt that alcohol plays some role in the production of cirrhosis, but this is claimed by Klopstock to be of a secondary nature, and to induce the cirrhosis only by lowering the patient's general resistance or by favoring gastro-intestinal changes which make these organs more subject to infectious and other diseases.

Though various infections can, according to Klopstock, induce cirrhosis of the liver, he believes that tuberculosis is the commonest etiological factor. In regard to the enlarged spleen and the ascites so frequently found in atrophic cirrhosis, he believes that neither of these is a direct resultant of the structural changes in the liver. The author calls attention to the fact that the spleen is much more like that found in the acute infections than like that found in other conditions characterized by obstruction to the portal flow. Concerning the ascites, Klopstock claims that in no other condition associated with long-continued obstruction to the portal circulation does ascites occur. He mentions, further, the chronic inflammatory changes manifested by the peritoneum in cases of atrophic cirrhosis, in which ascites has been a prominent feature, and, finally, calls attention to the frequency of the occurrence of tuberculous peritonitis in cirrhosis of the liver.

**Venous Hum in Cirrhosis of the Liver.** After observing an instance of venous hum in the epigastrium in a case of cirrhosis of the liver, Thayer<sup>2</sup> made an exhaustive study of the condition and came to the following conclusions:

<sup>1</sup> Berliner klin. Wochenschr., 1910, Nos. 33 and 34; 1911, No. 5.

<sup>2</sup> American Journal of the Medical Sciences, 1911, No. 468, p. 313.

A venous hum accompanied sometimes by a well-marked thrill may be detected in the epigastrium in some instances of hepatic cirrhosis.

The thrill and murmur may be appreciable: (a) Directly over the extensive cutaneous varicosities, or (b) in instances where there is little or no external evidence of venous engorgement.

In most of the cases in which an epigastric venous hum has been heard in cirrhosis, in the absence of cutaneous varicosities, the sound has been audible best about the umbilicus and along the median line in the epigastrium—in other words, along the course of the round ligament.

In a few of these instances it has been found that the incompletely closed umbilical vein has become greatly dilated as a result of increased portal pressure. In others, a large dilated vein has been found in the round ligament running alongside of the obliterated umbilical vessel—doubtless a dilatation of a small parumbilical vein.

These murmurs should be distinguished from the slight venous hum sometimes heard in the anemic just above and to the right of the umbilicus, over the inferior vena cava—murmurs which may be brought out by pressure in thin individuals. These murmurs are said to disappear, in some cases, with pressure on one or another femoral vein (Friedreich).

A venous hum has been described in Traube's space, and in the left side of the epigastrium in the angle between the large liver and the spleen in cirrhosis (von Jacksch, 1899), and in splenic enlargement (Piazza-Martini, 1898), which may arise in a varicose splenic vein.

A well-marked thrill and an intense venous hum may be heard in hepatic cirrhosis over a limited area in the epigastric notch, in the immediate neighborhood of the xiphoid cartilage, at a point so far above the lower border of the enlarged liver that it cannot depend upon currents in a varicose umbilical or parumbilical vein. Such murmurs may, in some instances, arise in varicose coronary veins (von Jacksch), while in others, as those observed by Catti and the author, the seat or origin is probably in anastomoses between the roots of the internal mammary and the inferior deep epigastric vessels, very possibly to the entrance into these latter veins of an enlarged parumbilical-xiphoid vein of Braune.

Two interesting cases of **acute yellow atrophy of the liver**, with complete pathological studies and exhaustive urinary examinations are reported by Novak and Whitney.<sup>1</sup>

**Actinomycosis of the Liver** is by no means common, as may be judged from the fact that Grill,<sup>2</sup> in his statistical report in 1895, mentions but 21 cases of involvement of the liver among 107 cases of actinomycosis of the digestive organs in general. Furthermore, the localization of the infection in any of the abdominal organs is relatively uncommon, as

<sup>1</sup> Archives of Internal Medicine, 1911, vol. vii, No. 3, p. 376.

<sup>2</sup> Beitr. z. klin. Chir., Band xiii.

may be seen from the estimations of Poncet and Berard,<sup>1</sup> who place the relative frequency of actinomycosis of the head and neck at 50 per cent.; the lungs and thorax, 20 per cent.; the abdomen, 20 per cent.; and other localizations, 5 per cent.

Actinomycotic abscesses of the liver may result from extension by continuity from neighboring organs or from metastatic extension by means of the blood channels, usually the portal system. In the former instance, a single abscess usually results; in the latter, the abscesses are multiple and scattered throughout the substance of the organ. Diehl<sup>2</sup> reports two cases of actinomycosis of the liver, one of each of these two types.

In considering the *symptoms of actinomycosis of the liver*, it must be recalled that the localization in the liver is secondary and that usually some primary focus can be discovered. There are, of course, symptoms of a profound infection, with more or less indifferent localizing symptoms in the liver. The prognosis is absolutely hopeless.

**Cholelithiasis.** Mayer<sup>3</sup> presents so satisfactory a résumé of the pathogenesis and therapy of cholelithiasis that it is well worth reviewing. The therapy he considers is medical, for he believes that surgical treatment is in place only in unusual conditions or dangerous complications of cholelithiasis. These he considers to be the severe forms of acute infectious cholecystitis; empyema of the gall-bladder; chronic recurrent cholecystitis, in case internal treatment has not proved satisfactory; chronic impaction, if this has resisted appropriate medical treatment for a period of approximately three months; and the suppurative processes in the neighborhood of the gall-bladder and in the liver.

Concerning the *pathogenesis of gallstones*, the old view of Naunyn, of an inflammatory origin, has been generally discarded. According to Naunyn's theory, though biliary stasis was a necessary condition for the formation of stones, it was so only because it permitted the implantation and growth of bacteria. Renvers<sup>4</sup> was one of the first to claim that concretions can result from simple biliary stasis alone. Exact experimental proof of this was later presented by Aschoff and Bacmeister.<sup>5</sup> These investigators showed that, in the great majority of cases, the occurrence of inflammatory stones is preceded by the existence of a non-inflammatory stone. They showed, further, that the different origins of the stones are characterized by differences in structure of the stone. The non-inflammatory stone, which is usually a solitary stone, is described as a "radial cholesterin stone." This non-inflammatory stone may lie for years without producing any symptoms or causing any

<sup>1</sup> Traité clinique de l'actinomycose humaine, Paris, 1898.

<sup>2</sup> Mitteilungen aus den Grenzgebieten der Med. u. Chir., 1910, Band xxii, Heft 1.

<sup>3</sup> Berliner klin. Wochenschr., 1911, No. 16, p. 707.

<sup>4</sup> Therap. d. Gegenwart, 1908, No. 3.

<sup>5</sup> Die Cholelithiasis, Jena, 1909.



subsequent changes, but may, on the other hand, be the cause of inflammatory changes which result in the formation of inflammatory stones. These are characterized by the presence of calcium salts derived from the mucus secreted by the glands of the gall-bladder. Frequently mixed stones are found consisting of a pure cholesterin centre surrounded by layers composed of calcium salts and biliary coloring matters.

As important as these investigations of Aschoff and Bacmeister are, they do not throw much light upon the ultimate cause of the stone formation. The fact is established that without biliary stasis no concretions can form. The stone formation can, consequently, be looked upon as a secondary phenomenon. It is, however, impossible to say how and under what conditions the elements of the stones are precipitated, and in how far physico-chemical processes play a part in this precipitation. It is extremely questionable if the biliary stasis alone is the ultimate cause of the stone formation, for biliary stasis as a result of tumors or catarrhal icterus may exist for long periods without resulting in stone formation. It seems very plausible that some other factor must be present besides the mechanical biliary stasis. This other factor may be an abnormal composition of the bile which permits a readier precipitation of the cholesterin than normal. This may be dependent upon alterations of the liver cells, or, as Neusser<sup>1</sup> believes, alterations in the blood which is the ultimate source of the bile.

With this assumption, we return to the old view that cholelithiasis is essentially a constitutional disease, which, in view of the hereditary tendency which can be frequently noted, and the apparent association of gallstones with certain anomalies of metabolism, Mayer thinks very probable.

As Aschoff and Bacmeister have proved beyond a doubt that the principal component of human gallstones, cholesterin, is derived from the bile, the natural deduction is that the predisposing factor in cholelithiasis stands in close relationship with cholesterin metabolism, and is probably dependent upon an increased excretion of cholesterin in the bile. It is impossible at the present day to bring any experimental proof in substantiation of this hypothesis, as the significance of cholesterin in the animal body as well as its origin and destruction are not at all understood. Nevertheless, an increased cholesterin excretion through the bile is *a priori* entirely possible. It is true that Naunyn, on the basis of investigations conducted in his clinic, claimed that the cholesterin content of the bile is constant and not influenced by either the character of the food ingested or the administration of cholesterin itself. The view was thus generally accepted that the cholesterin of the bile is not a product of the general metabolism and not a specific secretion of the liver, and, in fact, that cholesterin is not secreted from

<sup>1</sup> Deutsche Klinik, 1905.

the blood by means of the bile. This view, however, must at the present time, be discarded, for it has been shown by Goodman<sup>1</sup> that the amount of cholesterin in the bile is by no means independent of the constituents of the food; furthermore, Hepner<sup>2</sup> has found free cholesterin in the erythrocytes, and Kusumoto<sup>3</sup> found an increased excretion of cholesterin in the bile after the administration of poisons which cause an increased destruction of erythrocytes. Finally, in certain pathological conditions, especially in severe diabetes mellitus, Klemperer<sup>4</sup> found an increase of cholesterin in the blood. Mayer ventures the opinion that experimental investigation of the conditions governing the excretion of cholesterin will reveal many new and interesting facts of great importance in the pathogenesis and therapy of cholelithiasis.

**THERAPEUTICS.** It is, of course, impossible to base any therapeutic measures upon the hypotheses expressed above concerning the relationship of cholesterin metabolism to cholelithiasis. The two factors upon which our therapeutic measures must be based are that biliary stasis is of primary importance in the original establishment of the disease, and that in chronic inflammatory cholelithiasis, infection of the biliary tract is the all-important factor. As the stone formation itself is purely a secondary process, it would be entirely irrational to direct our therapeutic energies exclusively against it, for even if we could get rid of it, the factors which were responsible for its formation remain existent to induce further stone formation. Thus, the impression is more and more gaining foothold that the object of non-surgical therapy in cholelithiasis must be to allay biliary stasis and infection, thus producing latency in the disease which, according to Mayer, is almost equivalent to cure, for stones can remain *in situ* as harmless foreign bodies over periods of years so long as the flow of bile remains normal, and inflammation has been entirely eradicated.

In the attempt to overcome biliary stasis, the so-called *cholagogues* have had a prominent place. Yet the experimental evidence upon which their use is based is extremely unsatisfactory. Two of the most prominent cholagogues, *bile* itself and *salicylic acid*, have produced entirely different effects upon the bile in the hands of different investigators. Some have found them to produce a larger quantity of bile, containing fewer solids than normal; others a smaller quantity of bile containing the normal amount of solids; and still others a smaller amount of bile, containing a smaller amount of solids.

Of great importance in the regulation of the flow of bile is the action of the sphincter in the duodenal papilla. It is believed by some that the beneficial effects to be derived from cholagogues lies in the estab-

<sup>1</sup> Beiträge z. chem. Physiol. u. Path., 1907, vol. ix, p. 91.

<sup>2</sup> Pflüger's Archiv, 1899, Band lxxiii, p. 595.

<sup>3</sup> Biochem. Zeitschr., 1908, vol. xiv, pp. 5 and 6.

<sup>4</sup> Deutsche med. Wochenschr., 1910, No. 51.

ishment of a greater *vis a tergo* to overcome the resistance offered by the sphincter, and thus establish a free flow of bile. However, as the sphincter can resist a pressure of 700 mm. of water, and the pressure in the bile ducts is equivalent to but 200 mm. of water, it is extremely doubtful if the secretion of bile can be sufficiently stimulated to produce a *vis a tergo* sufficient to overcome the resistance of the sphincter. Furthermore, it is very probable that in some cases more harm than good would result from the increase in the secretion of bile, for in the case of total occlusion of the common bile duct, an increased production of bile must be attended by greater absorption into the blood channels.

Undoubted benefit can be derived from those cholagogues which, without greatly increasing the amount of bile secreted, decrease the percentage of solids contained in it. Mayer finds the most satisfactory of these to be *salicylic acid*, whereas *sodium salicylate* introduced by Rosenberg<sup>1</sup> is preferred by Stiller<sup>2</sup> and Furbringer.<sup>3</sup> Mayer believes, however, that more reliable results can be obtained in this direction by the abundant drinking of *water*, which should be drunk warm and preferably on an empty stomach. He recommends the drinking of from 200 to 500 c.c. of hot water in the morning before rising, and at night just before retiring. He thinks that much of the benefit resulting from a *Carlsbad cure* is dependent simply upon this drinking of large amounts of hot water. If, for any reason, large amounts of water cannot be taken by mouth, practically as good results attend its administration per rectum.

As the sphincter of the duodenal papilla is an important factor in the flow of bile, and as it opens only reflexly when stomach contents enter the duodenum, the more we can keep it open, by means of the frequent passage of the stomach contents into the duodenum, the more free will be the flow of bile. It is, therefore, beneficial to give food of an easily digestible nature frequently throughout the day. Mayer advises giving not fewer than *five meals a day*. Other factors which are of importance in maintaining the flow of bile are the intestinal movements, the influence of the intra-abdominal pressure, and the pressure of the diaphragm on the liver in inspiration. Attention to these factors is, therefore, indicated in cholelithiasis. Intestinal peristalsis should be regulated by the judicious administration of *laxatives*, but care should be taken against producing excessive peristalsis, as this may induce dislodgement of a stone with consequent biliary colic. The influence of the pressure of the diaphragm should be considered, and directions carefully given that this influence be not inhibited by the wearing of tight clothes, corsets, or the like.

<sup>1</sup> Berliner klin. Wochenschr., 1889, No. 48.

<sup>2</sup> Wiener med Wochenschr., 1905, No. 1.

<sup>3</sup> Verhandl. d. XI Congr. f. innere Med., 1892.



*Exercise* is undoubtedly of service when all manifestations of inflammation have subsided. In conjunction with these general bodily exercises, methodical breathing exercises should be indulged in. Until, however, all inflammatory manifestations have subsided and the patient has for some time been entirely free from pain and tenderness, absolute rest is probably the most important element in the treatment.

Mayer, in conclusion, emphasizes the serviceability of small, frequently repeated doses of *calomel* during an acute exacerbation when pain and fever are prominent features. He is unable to explain the nature of this beneficial action, but he is thoroughly convinced from repeated experiences that it is of the utmost service.

All of the various *hypotheses concerning the formation of gallstones* are ably considered by Clark,<sup>1</sup> and Klinkert<sup>2</sup> has performed experiments confirming those of Cushing,<sup>3</sup> that mechanical irritation of the gall-bladder in the presence of a mild bacteriemia results in the production of gallstones. The stones were found to consist of organic material and calcium salts of the bile pigments, consequently, according to Aschoff and Bacmeister, inflammatory stones.

The general diagnostic and therapeutic features of cholelithiasis are treated by Kehr,<sup>4</sup> Runyan,<sup>5</sup> Chase,<sup>6</sup> and Sherren.<sup>7</sup>

*Chologen.* Glaser<sup>8</sup> defends the use of "chologen" in the treatment of cholelithiasis. Kehr<sup>9</sup> replies to him, denying the existence of any especially beneficial effects from chologen. The unfavorable report on chologen by Eichler and Latz, who have been studying the various chologogues, was reported in *PROGRESSIVE MEDICINE*, December, 1910.

*Operation.* The attitude that many physicians adopt concerning operation for cholelithiasis is well expressed in the remarks of Mayer mentioned above, in which he defines the cases which he considers should go to operation. Many surgeons also take a more or less conservative view regarding operation. Kehr<sup>10</sup> says that he now operates in only two types of cases: (1) Those with "vital" indications; chronic obstruction of the common bile duct, acute and chronic empyema of the gall-bladder, perforation, and carcinoma. (2) Those with "relative" indications, all those cases in which long-continued symptoms or frequent attacks of colic have robbed the patient of enjoyment of life, or have endangered his ability to earn a living. This conservative attitude, however, is not manifested by all

<sup>1</sup> Boston Medical and Surgical Journal, 1910, vol. clxiii, No. 18, p. 675.

<sup>2</sup> Berliner klin. Wochenschr., 1911, No. 8, p. 335.

<sup>3</sup> Johns Hopkins Hospital Bulletin, August and September, 1899.

<sup>4</sup> Münchener med. Wochenschr., 1911, No. 12, p. 609.

<sup>5</sup> Journal of the American Medical Association, 1910, vol. lv, No. 27, p. 2293.

<sup>6</sup> Boston Medical and Surgical Journal, 1910, vol. clxiii, No. 17, p. 639.

<sup>7</sup> Lancet, 1911, No. 4570, p. 870.

<sup>8</sup> Münchener med. Wochenschr., 1911, No. 19, p. 1018.

<sup>9</sup> Ibid., No. 23, p. 1251.

<sup>10</sup> Ibid., 1910, No. 38, p. 1986.

surgeons. W. J. Mayo<sup>1</sup> believes that it is much better surgery to remove gallstones early rather than to wait for serious secondary changes. He claims that in the early operation the danger is minimized and the mortality very small; that but a small abdominal incision is required, thus shortening convalescence and lessening the danger of hernia; that it is not necessary to remove the gall-bladder, and this valuable organ is thus saved; and finally, that the early operation relieves the patient before deep-seated infections occur, which necessitate drainage of the liver ducts.

**Skiagraphy in Adhesions of Gall-bladder.** The diagnosis of adhesions between the gall-bladder and the stomach or duodenum by means of the Röntgen rays is claimed as a possibility by Pfahler.<sup>2</sup> The changes that permit the recognition of this condition consist in a displacement of the stomach and duodenum upward and to the right. This is an extremely interesting observation, and one that should be of great clinical value, though it must be recognized that the diagnosis can, in all probability, be made only by an experienced Röntgenologist.

Rather an unusual event in cholelithiasis, the *vomiting of a stone*, is reported by Pfeifferberger.<sup>3</sup>

**Torsion of the Gall-bladder.** One of the more unusual gall-bladder conditions is torsion, a case of which is reported by Fischer.<sup>4</sup> In his case, as in the others that have been reported, the gall-bladder was extremely long and the cystic duct also of unusual length. There were no adhesions, so that the gall-bladder constituted what might be termed a floating gall-bladder.

**Gangrene of the Gall-bladder.** An interesting case of gangrene of the gall-bladder without the presence of stones is reported by Friedrich.<sup>5</sup> He thinks it probable that cholelithiasis had existed with the occasional passage of stones in the stool. At the time of operation, however, there remained only an infectious cholecystitis, with gangrene of the gall-bladder wall and partial fibrous occlusion of the cystic duct.

**Osteoporosis and Biliary Fistula.** A condition of great importance in connection with diseases of the gall-bladder, and especially the surgical procedures undertaken for the treatment thereof, is considered by Seidel.<sup>6</sup> This consists in the osteoporosis attending the long-continued existence of biliary fistulæ. This condition was noted by Pawlow in some of his dogs with biliary fistulæ. The 2 cases of Seidel are, however, I believe, the first to be reported in the human being. The bone changes were found on microscopic examination to be osteoclastic. The changes

<sup>1</sup> Journal of the American Medical Association, 1911, vol. lvi, No. 14, p. 1021.

<sup>2</sup> Ibid., No. 24, p. 1777.

<sup>3</sup> Ibid., 1910, vol. lv, No. 12, p. 1024.

<sup>4</sup> Berliner klin. Wochenschr., 1910, No. 39, p. 1784.

<sup>5</sup> Deutsche med. Wochenschr., 1911, No. 19, p. 865.

<sup>6</sup> Münchener med. Wochenschr., 1910, No. 39, p. 2034.

are undoubtedly due to the removal from the body of a large amount of bile, but we know practically nothing more of the pathogenesis of the condition.

**Hydrops of Biliary System.** An unusual result of complete occlusion of the common bile duct is reported by Kausch<sup>1</sup> in a hydrops of the entire biliary system. Kausch considers that the enormous excretion of bile in his case, as much as 2000 c.c. a day, was a contributing factor to the hydrops.

**Diseases of the Gall-bladder and the Gastric Functions.** In an article on the relation of disease of the gall-bladder and biliary ducts to the gastric functions, Lichty<sup>2</sup> states that a lesion of the gall-bladder and ducts may disturb the gastric functions; that this disturbance most frequently consists of a hypersecretion of gastric juice and a diminution of gastric motility, and may be in direct proportion to the severity of the lesions present; that so-called hyperchlorhydria, with its accompanying symptoms, should be looked upon as an evidence of some definite pathological lesion somewhere in the gastro-intestinal tract or its appendages, and should be treated symptomatically only when organic diseases can be excluded with a satisfactory degree of certainty.

**Biliary Antiseptics.** Great practical and theoretical interest is attached to our ability to antisepticize the bile by means of substances administered by the mouth, yet there are few reports upon the subject, and these are somewhat conflicting. The subject has been experimentally investigated by Knick and Pringsheim.<sup>3</sup> They found that *menthol* and *hippol* (methylene-hippuric-acid) antisepticize the bile when given in large doses. *Urotropin* (hexamethylenetetramin) and *helmitol* (hydro-methylen-acetic-acid-hexamethylenetetramin) contributed but very slight antiseptic action to the bile, and then only when given in very large doses. A dog weighing 18.4 kg. was given 8 grams of urotropin a day for three days, and another, weighing 24 kg., was given 12 grams of urotropin a day for two days, and in both cases the result was practically negative. Calomel, the various combinations of salicylic acid, oil of turpentine, and methylene blue were all negative as to any antiseptic activity contributed to the bile.

**Action of Chologogues.** Eichler and Latz,<sup>4</sup> continuing their investigations of the drugs which are supposed to have chologogic action, found that *iridin* neither increased the flow of bile nor altered its composition. *Euonymin* rather decreased than increased the amount of bile, but had no influence upon the solid constituents. They therefore conclude that these two drugs can in no wise be looked upon as chologogues.

<sup>1</sup> Mitteilungen aus den Grenzgebieten der Med. u. Chir., 1911, Band xxiii, Heft 1.

<sup>2</sup> American Journal of the Medical Sciences, 1911, No. 466, p. 72.

<sup>3</sup> Deutsches Archiv f. klin. Med., 1910, Band ci, Heft 1 and 2, p. 137.

<sup>4</sup> Archiv f. Verdauungskrankheiten, 1911, Band xvii, Heft 2, p. 133.



## THE PANCREAS

**Tests of Functional Capacity of Pancreas.** The various methods of estimating the functional capacity of the pancreas have been the subject of several contributions, the most comprehensive of which are those of v. Korczynski<sup>1</sup> and Hirschberg.<sup>2</sup> Hirschberg finds, after a thorough investigation of the various methods in a number of cases of both acute and chronic pancreatic disease, that our methods of estimating the function of the pancreas are by no means satisfactory. When a number of the tests are applied to the same case there are always great variations in the results. These variations, he thinks, are dependent upon the character of the pancreatic disease, whether it involves merely a part or the whole of the organ, whether there is a complete or merely a partial obstruction to the flow of the secretion, and whether this obstruction is due to disease of the pancreas or of some neighboring organ, and upon the physiological principles upon which the test rests. Undoubtedly the best results from the application of any of the tests are obtained when a number of them can be employed in the same case; therefore chronic cases, which are subjected to long-continued examination, afford the best opportunities for application of the tests. Hirschberg believes that in acute pancreatitis the most serviceable test is that originated by Wohlgemuth, of estimating the diastitic activity of the urine.

Various opinions are held as to the serviceability of the *Schmidt nucleus test* in pancreatic disease, though I believe that at the present day the majority of investigators believe that it is of but little service. A number of observers are inclined to believe, on the basis of either clinical or experimental evidence, that the gastric juice is capable of digesting the nuclei. As, however, he claims that no experiments have been reported in which portions of meat have been subjected to the action of the various digestive ferments *in vitro*, Strauch<sup>3</sup> undertook an investigation of this nature, and concluded that pure gastric juice does not digest tissue nuclei, that pure pancreatic juice digests nuclei in six to eight hours, that pure intestinal juice has no influence upon nuclei, and that expressed intestinal juice digests cell nuclei, though slowly. However, a similar investigation was undertaken in Pawlow's laboratory by van Westenrijk,<sup>4</sup> who found that the nuclei are digested by the gastric juice, and concluded from his studies that the nucleus test, as described by Schmidt, is of no diagnostic value. In a case of achylia gastrica, however, the recovery of the meat in a macroscopically but slightly

<sup>1</sup> Wiener klin. Wochenschr., 1910, No. 32, p. 1171.

<sup>2</sup> Deutsche med. Wochenschr., 1910, No. 43, p. 1992.

<sup>3</sup> Deutsches Archiv f. klin. Med., 1910, Band ci, Heft 1 and 2, p. 128.

<sup>4</sup> Zeitschr. f. Exp. Path. u. Therap., 1910, Band viii, Heft 2, p. 353.

altered condition would speak for the probability of a decreased functional activity of the pancreas. Westenrijk believes that the test would be of some significance if the particles of meat were administered in a keratin capsule, as this would exclude the possibility of action by the gastric juice.

**Cambridge Reaction.** But two articles have appeared during the past year concerning the Cambridge reaction. For several years the articles on the reaction have been quite numerous, but I ventured to express the opinion in *PROGRESSIVE MEDICINE* last year that it would not be long before clinicians would be convinced that the reaction was of no significance in the diagnosis of pancreatic disease. One of the articles, that by Roper and Stillman,<sup>1</sup> deals purely with the chemistry of the reaction. The authors conclude that:

The "C" reaction, proposed by Cambridge, for the demonstration of a characteristic substance in the urine of patients suffering from diseases of the pancreas, does not rest on a sound scientific basis, as not all the glycuronic acid is removed in every instance by the technique of this reaction. The formation of the typical crystals is due to the presence of glycuronic acid. As this substance is present in the urine of persons in normal health, and is increased in amount in many conditions in no way associated with disease of the pancreas, the demonstration of these so-called typical crystals can have no diagnostic value.

The other article, by Kinney,<sup>2</sup> is more of a clinical nature, and consists for the most part of the results of the performance of the test on patients in the hospital service of Dr. John B. Deaver. Kinney's conclusions, after fifteen months' experience with the "C" reaction, are that the reaction has a very limited value. A negative reaction does not indicate that the pancreas is normal, for negative results have been obtained in acute and chronic pancreatitis, carcinoma of the pancreas, and cyst of the pancreas. Further, a positive reaction is not pathognomonic of pancreatic disease, as the reaction is found to be positive in some cases in which there is no evidence, even to direct palpation, that the pancreas is not normal. However, if history, physical examination, and examination of the feces point to the presence of a pancreatic lesion, a positive Cambridge reaction may be considered as completing the diagnosis. In other words, very little dependence can be put upon a negative reaction, and a positive reaction can only be considered of value as a confirmatory finding.

**Acute Pancreatitis.** THE CAUSE OF THE PROFOUND SYMPTOMS OF SHOCK in acute hemorrhagic pancreatitis has been the subject of considerable conjecture and experimentation. The subject has been discussed in previous numbers of *PROGRESSIVE MEDICINE*. Guleke and von Bergmann believe the cause to lie in the toxic action of the

<sup>1</sup> *Archives of Internal Medicine*, 1911, vol. vii, No. 2, p. 252.

<sup>2</sup> *American Journal of the Medical Sciences*, 1910, No. 465, p. 878.

products of autolysis of the pancreas or the secretions of the pancreas which is the seat of autolysis. This view has been contested, especially by Hess,<sup>1</sup> who holds that the soaps resulting from the action of the pancreatic juice on the body fat are the responsible agents in the profound symptoms attending acute hemorrhagic pancreatitis. Guleke and von Bergmann,<sup>2</sup> however, bring forward a new series of experiments in support of their views. One of the most convincing experiments in support of their contention is one which seems to prove that an animal can be immunized against the toxic effects of an acute hemorrhagic pancreatitis by the injection of increasing doses of pancreatic juice.

**EARLY OPERATION.** Judging from the reports in the literature, acute hemorrhagic pancreatitis seems to be recognized more frequently than formerly, and surgical measures seem to be employed more frequently and probably earlier than they used to be. Coenen,<sup>3</sup> in reporting several operative cases of acute pancreatitis, calls attention to the gradual change in attitude that has taken place among physicians in regard to the early operation, and notes how similar this is to the history of the surgical procedures in acute appendicitis. He believes, furthermore, that the same improvement in the mortality statistics in acute pancreatitis will occur as did in the case of acute appendicitis, when the importance of early operation becomes fully recognized. This view seems to be substantiated by the statistics of Küttner,<sup>4</sup> which show a reduction in Breslau, when the early operation was performed, from 30 per cent. to 8 per cent., and those of Dreesmann,<sup>5</sup> in which the best results were found in 40 cases of early operation, with 80 per cent. of cures.

Balch and Smith<sup>6</sup> report 21 cases of acute pancreatitis occurring in the Massachusetts General Hospital and the Faulkner Hospital, and advise early operation in all cases in which the shock is not so great as to lead to the belief that operation would prove fatal. Two operative cases, terminating in recovery, are reported by Truesdale,<sup>7</sup> and one each by Gillespie,<sup>8</sup> Barker,<sup>9</sup> and Wright.<sup>10</sup>

**Chronic Pancreatitis.** Sailer,<sup>11</sup> writing on chronic pancreatitis, and remarking upon the indefiniteness of the clinical picture in the majority of instances, states that the symptoms resolve themselves into: (a) Some discomfort apparently associated with the stomach; (b) evidence of indigestion; (c) pain of any degree or variety, sometimes in the neighbor-

<sup>1</sup> Grenzgebieten d. Med. u. Chir., Band xix, Heft 4.

<sup>2</sup> Münchener med. Wochenschr., 1910, No. 32, p. 1673.

<sup>3</sup> Berliner klin. Wochenschr., 1910, No. 48, p. 2177.

<sup>4</sup> Chirurgenkongress, 1910.

<sup>5</sup> Münchener med. Wochenschr., 1909, No. 14.

<sup>6</sup> Boston Medical and Surgical Journal, 1910, vol. clxiii, No. 10, p. 384.

<sup>7</sup> Ibid., No. 12, p. 462.

<sup>8</sup> Lancet, 1911, No. 4573, p. 1073.

<sup>9</sup> Ibid., 1910, No. 4548, p. 1264.

<sup>10</sup> Ibid. 1911, No. 4579, p. 1498.

<sup>11</sup> American Journal of the Medical Sciences, 1910, No. 462, p. 330.



hood of the umbilicus, and sometimes elsewhere in the abdomen; and, as more definite signs, but occurring only occasionally: (d) jaundice; (e) a distended gall-bladder; and (f) a more or less evident mass in the region of the umbilicus that can be differentiated occasionally from the stomach. In addition, there are the various laboratory tests which have been referred to above, each of which has, at some time or other, been claimed to be of great importance in the diagnosis of chronic pancreatitis.

Sailer believes that we can divide cases of chronic pancreatitis into three clinical types: (1) The first type may be represented by the group of cases in which, either as a cause or as a complication of pancreatic sclerosis, there is obstruction of the duct of Wirsung and the common bile duct. Among these are particularly the instances of lodgement of a gallstone in the ampulla of Vater. These cases are all characterized by jaundice, sometimes also by distention of the gall-bladder, producing a palpable tumor, emaciation, digestive disturbance, and the various changes in the secretion and discharges available for examination, that indicate deficient functional activity of the pancreas. If, in addition, there is a history of gallstone colic, and a palpable mass in the region of the umbilicus, which may also be tender, it would seem that a correct diagnosis should be reached. (2) The second type includes cases in which the swelling of the head of the pancreas is so great that a palpable tumor is present. There may also be jaundice, which frequently is of the most intense character, and the other symptoms that have been described. Sailer believes that these cases cannot be definitely differentiated from carcinoma of the pancreas without operation. (3) The third type includes the group of cases, and presumably much the largest group, in which there is neither jaundice nor a palpable mass.

Cambridge<sup>1</sup> suggests the following classification for chronic pancreatitis: (1) A dyspeptic type, in which the disease is due to morbid conditions of the intestine, and the symptoms are mainly referred to the digestive organs. (2) A cholelithic type, most commonly associated with the presence of gallstones in the common bile duct, in which there is usually, but by no means necessarily, chronic jaundice, and the predominant symptoms are referred to the biliary system. (3) A miscellaneous group, in which the pancreatitis is secondary to malignant disease or is the result of disease of the circulatory system, etc. (4) A diabetic type, in which there is more or less glycosuria, and into which the members of the preceding types of the disease are apt to terminate if they are allowed to progress unchecked.

**Pancreatitis and Cholecystitis.** Arnsperger<sup>2</sup> believes that, though the pancreatitis resulting from cholelithiasis finds a ready explanation in the intimate anatomical relationship of the biliary duct and the duct of

<sup>1</sup> *Lancet*, 1911, No. 4579, p. 1494.

<sup>2</sup> *Münchener med. Wochenschr.*, 1911, No. 14, p. 729.

the pancreas, the same does not hold true of that form of pancreatitis usually limited to the head of the pancreas, which is secondary to cholecystitis. This, he believes, spreads from the infected gall-bladder by way of the lymph channels. In many cases this really should not be called a pancreatitis, for it is more of a simple swelling of the lymphatic apparatus of the head of the pancreas—a lymphadenitis pancreatica.

As proof of his claims, Arnsperger mentions the following: (a) The anatomical demonstration of lymph channels leading directly from the gall-bladder to the pancreas; (b) the clinically observed spread of lymphangitic processes from the glands about the gall-bladder and cystic duct and in the neighborhood of the hepatic and common bile ducts to the pancreas; and (c) the course of metastasis in primary carcinoma of the gall-bladder, which is with great frequency to the head of the pancreas. Arnsperger believes further that this lymphangitic swelling of the head of the pancreas and of the lymphatic glands in the hepatoduodenal ligament is responsible, in many cases, for the icterus occurring in the course of simple cholecystitis.

Deaver,<sup>1</sup> writing on the association of chronic pancreatitis with gall-stone disease, notes that a number of his cases have been apparently due to cholecystitis rather than cholelithiasis, and that in some instances he has found no disease of the biliary tract whatever. He believes that in these cases the inflammation which is responsible for the pancreatitis ascends directly from the duodenum.

**Carcinoma of the Pancreas.** The results of the study of 35 cases of carcinoma of the pancreas are published by Heiberg.<sup>2</sup> In 23 of the 35 cases, the tumor was exclusively in the head of the pancreas; in 5, it involved the whole organ; in 5, it was located in the tail, and in 2 in the body of the pancreas. Nineteen of the 23 cases of carcinoma of the head of the pancreas were accompanied by jaundice, as were also one of carcinoma of the tail and 2 of carcinoma involving the entire gland.

Dilatation of the gall-bladder was clinically demonstrable in but 2 cases, whereas at autopsy some degree of dilatation was demonstrable in 19. Ascites was present as a clinical manifestation in 8 cases, and was found at autopsy in 6 additional cases. A tumor was demonstrable in 3 cases of carcinoma of the head, and in 3 cases of carcinoma of the tail. Pain, deep down and radiating toward the back, was a prominent symptom in three-fourths of the cases. In 3 of the cases, spontaneous glycosuria occurred; alimentary glycosuria was not observed in any of the cases.

<sup>1</sup> Journal of the American Medical Association, 1911, vol. lvii, No. 1, p. 11.

<sup>2</sup> Zeitschr. f. klin. Med., 1911, Band lxxii, Heft 5 and 6, p. 463.





# DISEASES OF THE KIDNEYS

BY JOHN ROSE BRADFORD, M.D.

**Distribution of the Renal Arteries.** Gèrard<sup>1</sup> has made a most elaborate study of the distribution of the renal arteries in animals and in man, studying both a simple kidney, such as that of the rat, consisting of but a single pyramid, and the human kidney which is a complex, multi-pyramidal organ. He also deals exhaustively with the literature of the subject, and shows what divergent and conflicting views have been held as to the origin of the arteries destined to supply the medullary portion of the kidney. In most treatises and text-books the arterial supply of the medulla of the kidney has been regarded as of twofold origin, some of the arteries being described as direct branches of the primary divisions of the renal vessels, and others as being the continuation of the efferent vessels of the Malpighian capsules. According to this work of Gèrard, the distribution of the vessels in the human kidney may be summarized as follows: The branches of the renal artery reach the renal parenchyma at the junction of the columns of Bertini with the medulla. They penetrate between the cortical substance of Bertini's columns and the medullary substance of the Malpighian pyramids, and they run throughout their course at this junction line toward the cortex. Thus they may be called peripyramidal or interlobar arteries. Upon reaching the base of the pyramids they curve in at a very obtuse angle between the bases of the pyramids and the cortical substance, and form those semi-arches over the bases of the pyramids. But these interlobar arteries never anastomose with their fellows, and thus complete arches, such as are described in most writings, do not exist. The interlobar arteries during their course send branches to the cortical substance of the columns of Bertini, but they send no branches to the Malpighian pyramids. The incomplete arches send off the interlobular arches from their convexity destined to supply the renal cortex, but they give off no branches from their concavity to the medulla. And thus, according to Gèrard, the entire blood supply of the medulla is derived from the efferent vessels of the glomeruli. This author derives these conclusions from the study of injected preparations cut in serial sections; and in the case of the simple unipyramidal kidney of the rat, from the study of a reconstructed wax

<sup>1</sup> Journal de l'Anatomie, 1911, vol. xlvii, No. 2.

model made as a result of the drawings of a complete series of sections involving the entire organ.

**Effects of Renal Disease upon the Suprarenal Glands.** Nowicki<sup>1</sup> has conducted an inquiry into the changes produced by renal diseases on the suprarenal glands, and especially on their chromaffine content. He was led to these researches owing to the fact that adrenalin has been discovered in the blood of patients suffering from nephritis; and, in order to elucidate this, he investigated the effects produced on the chromaffine substance of the suprarenal glands by removal of one or both kidneys in animals, and also the effect produced by unilateral extirpation of one suprarenal on the remaining gland. He also observed the effects produced on the chromaffine substance by the injection into the blood stream of adrenalin, and of the serum of nephrectomized animals; also the effects of the serum in uremia, and of normal urine and the urine of chronic nephritis. The observations on the effects of nephrectomy were carried out mainly on rabbits, and when double nephrectomy was performed and the duration of life was therefore but short, microscopic examination of the suprarenal did not show any remarkable changes in the suprarenal cortex. But the medullary substance always showed some hyperemia, and this was sometimes extremely well marked. In the cases in which the animals survived for a longer time, the chromaffine substance was diminished in amount, and the author concludes that the extirpation of the kidneys produces an irritation and an increased functional activity of the suprarenals which reveals itself in the hyperemia and increased volume of the medullary substance, and the changes in the amount of chromaffine present. Nowicki tested the view that these phenomena might be due to the retention of urinary products in the circulation by observing the results on the chromaffine substance following the injection of normal urine into the circulation; but he observed few, if any, obvious effects. On the other hand, the injection of the urine from cases of chronic nephritis produced a very marked hyperemia of the medulla, together with an increase in its volume, and a total disappearance of the chromaffine substance. In the human subject, Nowicki observed that in cases of hemorrhagic nephritis there was considerable hyperemia of the suprarenals, and some localized extravasations, principally in the cortical substance. Otherwise the suprarenals presented no marked changes. In cases of chronic nephritis, however, the changes were more marked. Thus, when chronic nephritis was well marked, with associated cardiovascular changes and cardiac hypertrophy, the chromaffine substance was of a pale yellow color, and diminished in amount, especially in the cases in which death had resulted directly from the nephritis. In other cases in which death had occurred as the result of some complica-

<sup>1</sup> Archives de Médecine Expérimentale, tome xxii, No. 4.

tion, *e. g.*, cerebral hemorrhage, the chromaffine substance was not only not diminished, but, on the contrary, was increased in amount, and of a dark brown color. In cases in which death had resulted from uremia, there was much hyperemia of the suprarenal medulla, and the chromaffine substance was much diminished in amount. The author considers that these results show that in renal diseases there is much increased functional activity of the suprarenals, and that this is confirmed by the further fact that in renal disease there is an increased quantity of adrenalin in the blood stream. This increased activity of the suprarenals is probably due to the presence in the blood of substances capable of stimulating and increasing the activity of the glands; and it is, therefore, possible that the hypertrophy of the heart and the arterial lesions accompanying chronic renal disease may owe their origin to this increased formation of adrenalin.

**Function of the Glomerulus.** T. G. Brodie, in the *Canadian Medical Association Journal*, vol. i, No. 1, discusses anew the function of the glomerulus, and advances the view that the glomerulus is a means by which a pressure head is established in the kidney sufficient in magnitude to drive the urine down the uriniferous tubules. He points out that the renal tubule is necessarily a long tube with a very narrow lumen, and that if Poisseuille's law governing the flow of fluid along capillary tubes is applied to the kidney, a very considerable pressure is required in order to drive the urine along the tubules to the pelvis. If the length of the uriniferous tubule, its diameter, and the volume of fluid flowing along the tubule in a given time be known, then by calculation from Poisseuille's law the amount of pressure required to maintain the flow may be determined. Brodie determined experimentally the rate at which the urine was discharged from one kidney. The kidney was then removed with suitable precautions, hardened, and the number of glomeruli determined in a fragment of known weight by cutting it into serial sections and counting the number of glomeruli. From this the number of glomeruli in the entire kidney could be calculated; and Brodie came to the conclusion that, on the average, in the dog's kidney there were 210,000 glomeruli, and therefore 210,000 tubules. The lumen of the tubules was determined by observation, and data already exists as to the length of the tubules. From these data the pressure head in a Beauman's capsule can be calculated approximately; and Brodie thinks a pressure head of as much as 93 mm. of mercury may be required to drive the urine along the tubule in order to maintain the rate of urine flow observed in his experiments. If such a high pressure is required, only two possible sources capable of providing it exists, as Brodie points out—(1) a secretory pressure set up in the glomerulus or renal tubule, and (2) a direct pressure transmitted through the glomerular epithelium from the blood pressure. There is no physiological evidence in favor of the existence in the kidney of any secretory pressure



at all analogous to that known in such glands as the salivary. The maximum pressure at which urine can be discharged is some 30 or 40 mm. of mercury less than the arterial blood pressure. Brodie, therefore, believes that the pressure is transmitted in undiminished amount through the glomerular capillary wall, because he thinks the glomerular epithelium offers little or no resistance to distention. With an aortic blood pressure of 120 mm. of mercury, he estimates that the glomerular capillary pressure may be some 90 mm. of mercury; and this, on the basis of the above calculation, would be an effective pressure for this propulsor action of the glomerulus. This novel view of the function of the glomerulus is, of course, incompatible with the old view of the Ludwig school that Beauman's chamber is purely a filter; and Brodie considers that many of the points that have been advanced in favor of the filtration theory are better interpreted on his propulsor view. Thus the general structure of the glomerulus, consisting as it does of a series of thin-walled distensible loops projecting into the interior of the capsule, not capable of expansion beyond a certain limit, and the fact that the afferent vessel is of large diameter while the efferent vessel is smaller, are all assisting factors, and point to a rapid loss of pressure head at this point in the circulation. And Brodie also considers that the inexpandible capsule of the kidney may serve to prevent any dangerous overdistention of the more delicate structures, such as the glomerular loops and Beauman's capsule. Again, the propulsor theory explains and reconciles, according to Brodie, the various observations that have been made on the ureter pressure, when it is stated that the maximum ureter pressure is really the maximum pressure in the glomerular capillaries. This theory of Professor Brodie is an attractive one, although perhaps not one readily acceptable to those physiologists who still regard the function of the glomerulus as that of a filter. Yet it certainly affords an ingenious explanation of the flow of urine along the uriniferous tubules, a flow difficult of explanation on the basis of the older views. Brodie, in this paper, also draws attention to the well-known fact that certain diuretics of the caffeine group have not only an action on the renal vessels and on the cardiovascular system generally, but have also a potent direct action on the renal epithelium. This is especially marked in the case of caffeine, and from a theoretical standpoint it is doubtless, as Brodie states, an objection to its use in cases of nephritis. Still, the fact remains that caffeine may be of great service in the treatment of chronic, and even in advanced chronic, nephritis. At the same time, caution must be employed in its use, as, if it fails to produce a diuretic effect, or if given repeatedly and in too large doses, toxic and serious results may ensue. On the other hand, probably all physicians have seen cases of chronic and persistent edema in nephritis which have subsided rapidly under the influence of moderate, occasional doses of caffeine or theocin.

**Dropsy in Heart Disease and in Bright's Disease.** Lakin<sup>1</sup> has conducted an elaborate inquiry on the *genesis of dropsy in heart disease and in Bright's disease*, more especially to determine whether in uncompensated heart disease and in kidney disease there was an abnormal amount of water present in the blood. He also investigated at the same time the excretion of sodium chloride in the urine to determine whether any correlation existed between chloride elimination and dropsy, and to ascertain, if possible, which was the cause and which was the effect. Finally, the elimination of urea was also determined. Heart disease and Bright's disease are, of course, the two conditions in which dropsy is most frequently met with, and although there are points of difference in the dropsy in these two conditions, yet there are also many points of resemblance. So much is this the case that some authorities have gone so far as to suggest that cardiac dropsy is nothing more than renal dropsy in a case of heart disease; in other words, that dropsy in cardiac cases does not ensue until the heart disease has seriously compromised the functions of the kidney. This extreme view, of course, has not been generally accepted; and Lakin's observations show that, upon analysis, there are very considerable differences revealed in the factors causing dropsy in cardiac and in renal disease. Lakin examined all cases in which dropsy was a prominent symptom, and in most cases observations were made daily. The hemoglobin content of the blood was estimated by Haldane's modification of Gowers' hemoglobinometer. Twenty-four specimens of urine were used to determine the daily excretion of urea and chlorides. The absolute quantities of nitrogen and of sodium chloride in the diet were not calculated, but it was assumed that a normal adult on an average full-mixed diet excreted about 500 grains of urea, and 150 to 180 grains of sodium chloride. When the patient was put on a milk diet it was assumed that each pint of milk contained 4 grams of nitrogen and 1 gram of sodium chloride. Lakin's deductions were made on the comparative amounts of urea and sodium chloride excreted from day to day, and in a large proportion of cases the diet of the patients remained the same during the whole period of observation. Cases in which a uniform diet could not be demonstrated for any length of time were not included. His series of cases included 25 cases of heart disease, comprising both valvular lesions and myocardial degeneration. They were all, however, suffering from dropsy on admission. Twenty cases of nephritis were investigated, and the majority of these presented dropsy, but others were included for the sake of comparison. No cases were included in either series in which there was any doubt as to the diagnosis. Thus the cardiac cases were purely cardiac, and the renal cases purely renal; and they were all examples of parenchymatous nephritis. No case of cardiac disease secondary to interstitial nephritis was included,

<sup>1</sup> Medical Chronicle, vol. liii, Nos. 313 and 314.

nor any case in which the renal disease was obviously secondary to a cardiac lesion. It has long been known that in Bright's disease the blood has often a low specific gravity, and that an increased amount of water is present. Kössler showed that the blood corpuscles may continue to contain their normal percentage of solid substances, and that therefore the low specific gravity is due to a true hydremia. Thus, the specific gravity of the serum may fall to 1022, or even 1018, from a normal of from 1027 to 1032. Hydremia is more common in parenchymatous nephritis than it is in acute renal disease, and this is probably to be correlated with the fact that in parenchymatous nephritis there is almost invariably an accompanying edema. The percentage number of cells of hemoglobin and the solid substances of the plasma are all diminished. In severe and prolonged cases, anemia, as well as hydremia, is present. Lakin found, in five cases of parenchymatous nephritis in which no edema was present, that the hemoglobin percentage is sometimes normal, but more often subnormal; but, if subnormal, that the loss is due to simple anemia and that there is no evidence that the blood in such cases is hydremic in the true sense of the word. In the cases of edema, the hemoglobin percentage was subnormal in all, and the percentage rose in all as the edema subsided. But in the great majority the hemoglobin percentage never reached the normal, even after the disappearance of the edema. In one or two cases the percentage of hemoglobin rose, temporarily, markedly above the normal while the edema was subsiding. The hemoglobin percentage depends to some extent on the degree of dropsy present, and Lakin thinks that in chronic nephritis there is always a certain degree of hydremia, which varies directly with the amount of edema. But in most cases there is also some anemia, and this is well seen when the dropsy has disappeared, or when it has not been present. Lakin considers that in parenchymatous nephritis the output of urea is always subnormal, but there may be great individual variations in the daily quantities excreted. There is also some connection between the presence of edema and a low excretion of urea. The highest level in urea excretion is most apt to occur at a time when edema is subsiding, and it may for a short time, at this period, exceed the normal. With this exception, the output of urea is subnormal. It is highest in the cases in which there is no edema throughout the illness, and in cases in which edema is present at the outset but subsequently disappears the output of urea is higher at the non-dropsical than at the dropsical periods. As regards the output of chlorides, in six cases the output of sodium chloride was approximately normal and corresponded closely to the intake. In 3 cases the output was distinctly higher than the intake. In the remaining 11 the output was diminished, and in 4 cases very markedly so. All these 4 cases were fatal, and suffered from uremic symptoms. Of the daily output of sodium chloride, less than 25 per



cent. was excreted. It would seem from these results that a greatly diminished sodium chloride excretion was a very unfavorable sign from a prognostic point of view. It is, however, important to recognize that an adverse conclusion of this kind can only be drawn as a result of prolonged observations, as a diminution of chloride excretion may be only a temporary phenomenon.

The relation of the chloride excretion to edema is somewhat complex, inasmuch as the retention of water may be primary, and due either to incapacity of the kidneys to excrete, or to feebleness of the circulation, or possibly to some change in the capillary walls. In all these conditions the retention of water would be primary, and the sodium chloride retention purely secondary. On the other hand, the sodium chloride might be retained primarily in the tissues, and the retention of water and the production of edema be secondary to it. Lakin found, in his observations, that salt retention is always met with in the presence of edema, even when the output is greater than the intake; while the edema is disappearing, such excretion indicating that the sodium chloride previously accumulated is now being eliminated. There is not, however, always a normal excretion in the absence of edema. It is frequently subnormal, even long after all edema has disappeared; that is to say, retention of salt may occur apart from edema. Further, there may occasionally be marked edema and yet no retention of sodium chloride; and in one case it appeared that the sodium chloride output might even increase as the dropsy became more marked. Lakin thinks that these facts show that the sodium chloride excretion has not always the same significance in the genesis of edema. Although the retention of water cannot always be primary, it is equally impossible that the retention of chlorides can always be primary, and that in chloride retention we have the key to the solution of the whole problem of edema. Imperviousness of the kidneys to chlorides and retention of the latter in the body fluids is undoubtedly, according to Lakin, the cause of edema in many cases. On the other hand, it is probable that other cases arise from entirely different causes. He thinks this is the explanation of the divergent opinions as to the efficacy of a salt-free diet in renal dropsy. Such a diet might be successful in cases in which the dropsy arises from retention of salt, and yet fail in others in which the dropsy was due to other causes. Lakin thinks that the mechanical theory of renal dropsy—namely, an insufficient water excretion—is applicable to many cases. The main objection to this theory has always been the fact that dropsy does not arise in cases of anuria due to other causes than nephritis. It is possible that, as von Noorden points out, the explanation of this undoubted fact may be that such patients retain very little food, and that superfluous water, therefore, cannot accumulate. It is stated that if large quantities of water are given to such patients, anasarca may develop. The theory has been advanced that the hydremia

of Bright's disease is produced by the imperfect urinary excretion of water. Lakin is not inclined to accept this in its entirety, owing to the fact that in cardiac disease, when there may also be an incomplete excretion by the kidneys, there is no hydremia, and therefore he thinks that mechanical considerations are not sufficient to account for the hydremia of renal disease. Although the mere accumulation of water may have a most important share in the production of edema, it does not explain all the phenomena of renal dropsy, nor does it explain, according to Lakin, the occurrence of hydremia. Thus, edema may persist without variation for months, notwithstanding a free diuresis, and notwithstanding a considerable diminution in the supply of water. And in these cases Lakin considers it improbable that water is attracted to the blood and tissues, with the consequent production of dropsy and hydremia, and that toxic substances may be retained or formed in the body which increase the attractive capacity of the blood and of the tissues for water. They may be present in the blood owing to diminished urinary excretion, or in the tissue spaces, or in both situations. According to this view, edema and hydremia would both be due to a common cause, but yet in individual cases only one or other might be present. The accumulation of sodium chloride in the body may bring about retention of water in the tissues owing to its effect on the osmotic pressure. Hence with an increase of edema there must be a retention of urinary substances; and when the edema subsides, a corresponding outflow of such bodies. The fundamental question with reference to sodium chloride, however, is whether the sodium chloride retention is always secondary to the accumulation of water, or whether it is sometimes primary, a cause, therefore, and not the effect of the dropsy. In some cases of Bright's disease, even after all edema has disappeared, the output of sodium chloride is often markedly subnormal, and in cases in which there has never been any edema, sodium chloride may be retained. It must be assumed that in these cases the sodium chloride retention is primary. Further, the addition of chlorides to the diet may result in edema, and a diminution of chlorides may produce free diuresis. In these cases there can be no doubt that the retention of the chlorides causes the edema. It would thus seem to be clear that many factors may unite in producing renal dropsy, and that the view that it is always due to a uniform cause can no longer be maintained.

Lakin summarizes his conclusions by stating (1) that renal dropsy may be primarily mechanical; (2) it may be the result of toxic materials formed or stored in the body; (3) it may depend upon the primary retention of chloride. The blood in renal disease with dropsy is always hydremic. As the edema subsides the hydremia becomes less marked, but there is no causal relationship between hydremia and edema, and both are probably due to the presence of substances in the body which increase the attractive capacity of the blood and tissues for water.

**Origin of Urinary Calculi.** Gordon<sup>1</sup> deals with the question of the origin of urinary calculi, and draws attention to the very divergent views held in different countries with reference to the etiology of this disease. In most countries great stress has been laid at different times on the influence of diet as a causative factor, and perhaps undue stress has been laid upon the influence of diet on the amount of the particular calculus-forming ingredient present in the urine. Thus, an excessive meat diet has been held responsible for the production of uratic stones, on the view that the amount of uric acid in the urine is notably increased on such a diet. Of late years this conception has been somewhat modified so as to incriminate more especially particular forms of meat, namely, those rich in purin bases. More extended observations, however, soon showed that similar uratic stones might be found in individuals and in races and in countries where meat was not a predominant article of diet, *e. g.*, India; although it must be confessed that in India the incidence of the disease would seem to be specially marked in the legumen eater, the native living mainly on rice being, at any rate, less liable, if not exempt. A meat diet, however, may affect the composition of the urine in other ways than by increasing the amount of uric acid excreted. Thus, it may cause the urine to be more acid, and hence may lead to an undue precipitation of the uric acid, although the actual quantity present may not exceed the normal. The late Sir William Roberts drew attention to the fact that uric acid stones were often formed in dilute urines when there was no excess of uric acid, and, therefore, that in calculus formation the factors that kept the uric acid in the form of a soluble salt might be far more important agents in determining the formation of a calculus than the mere percentage amount of uric acid present. Further, it was soon realized that different causes were invoked in different countries to explain the genesis of similar varieties of calculus, and thus observers were led to seek other explanations than the mere excess in the urine of the particular ingredient concerned in the calculus formation. Factors influencing the form of crystallization soon attracted notice. Thus, the presence of colloid material in the urine was observed to lead to the formation of large crystals of calcium oxalate, and such a large crystal might well act as a nucleus around which, by subsequent accretion, a calculus might form. In some countries, *e. g.*, Egypt, the presence of bilharzia hematobia in the vesical epithelium was early recognized as a cause of vesical calculus, inasmuch as the ova were found as nuclei of the calculi. In the case of calcium oxalate stones it is interesting to note that until quite recently stress was laid mainly, if not entirely, on the quantity of oxalic acid in the diet or in various articles of diet, and but little attention was paid to the part played by calcium in metabolism.

<sup>1</sup> Canadian Medical Association Journal, vol. i, No. 2.



It is now recognized that calcium metabolism is probably an important factor in the genesis of oxalate calculi, and that the production of the stone is not so much a question of the amount of oxalic acid as of the fact that it is excreted in the form of a calcium salt instead of in that of a more soluble salt, such as sodium oxalate. Calcium in excess may be derived from the ingesta, especially in the form of water, certain alkaline waters and hard waters containing very considerable quantities of calcium. Further, it is possible that it may be derived from the breaking down of calcium-containing tissues, such as bone, and Gordon thinks that this is liable to occur in some forms of neurasthenia and in old age. Further, calcium may be eliminated in greater amount in the urine when catarrhal inflammation of the colon interferes with the normal activity of this part of the gut in excreting calcium. Although these various constituents of urinary calculi must have some influence on the formation of stones, yet as Gordon points out they are probably not the most important factor. They are found in normal urine, and stone is a pathological product and is formed quite irrespective of the abundance or deficiency of these ingredients. Gordon asks the question, What is it then that agglutinates these salts so as to form a stone? If some cement substance binds to salts of the urine before they can be voided, the foundation of the stone is laid, and provided the supply of the material is continued, the growth of the stone is assured. Gordon believes that these cementing substances are probably colloids, but not the colloids of the normal urine. The coloring matters of the normal urine are colloids, and they undoubtedly attach themselves to such crystalloids as the urates. According to Gordon, the difference between the normal colloids and pathological colloids lies in the fact that the normal colloids are capable of absorbing particles of crystalloids and then releasing them; whereas the pathological colloids absorb particles but do not release them. It is possible that several of these cement materials may exist and may have different affinities for different constituents of the urine. Thus, it is not improbable that all oxalate stones may owe their origin to the crystals being bound together by blood. Thus, Gordon quotes Schade as having been able to manufacture an oxalate stone by beating up oxalates in blood. Further, iron has been found on chemical analysis of oxalate stones, and this presumably is derived from hemoglobin. It is possible that fibrinogen is the substance which acts in this manner, as whipped blood fails to form a calculus when beaten up with oxalate salts. The matrix of a triple phosphate stone is formed by the action of pathological microorganisms, and is probably a substance allied to mucinogen.

These views with reference to the formation of calculus are of some practical importance with reference to the prophylaxis of stone, inasmuch as everything must be done to diminish or to prevent any inflammatory affection of the urinary tract; and where infection of that tract

is present it should be controlled as much as possible by the action of urinary antiseptics. Gordon considers that, when decomposition of the urine is present, it is inadvisable to administer lime or magnesia or alkalies, inasmuch as they may increase the supply of crystalloid material and thus lead to the formation of calculi. He thinks, with Sir William Roberts, that abundance of plain water is to be recommended as a prophylactic, rather than the advocacy of particular mineral waters. There is less probability of the action of these colloid materials in binding crystalloids together when the urine is very dilute. Further, in dieting cases of oxaluria, it is important to pay attention to restricting the amount of calcium taken.

**Urinary Antiseptics.** There is much diversity of opinion as regards the efficacy of the urinary antiseptics in common use. Thus, even in the case of *urotropine*, many different statements are made as to its value; and these cannot be entirely due to differences in the pathogenic organisms present in the urinary infections. Jordan<sup>1</sup> has carried out a series of exact observations on the action of *urotropine*, *sandal-wood oil*, and *salicylic acid* on various microorganisms which are liable to affect the urinary tract, and especially the putrefactive organisms, the *Staphylococcus aureus* and the *Bacillus coli*.

The experiments were conducted as follows: The normal urine of a healthy individual was collected, as far as possible under constant conditions, and the determination of the total acidity made. The acidity and alkalinity of the urine was varied when necessary by taking acid sodium phosphate or potassium citrate by the mouth. In some of the experiments with sandal-wood oil and with salicylic acid, the acidity was increased or diminished by adding directly to the urine known quantities of acid sodium phosphate or sodium bicarbonate. This method was found to be satisfactory, as the same results were obtained as if the drug had been taken by the mouth. The drugs to be tested were taken by the mouth for periods of three and five days, and the specimen of urine was not tested until the drug had been taken for at least twenty-four hours. In the observations on the efficacy of urinary antiseptics on the putrefaction of the urine, the urine was incubated in chemically clean but unsterilized tubes at the body temperature, and allowed to putrefy, the time of occurrence of putrefaction being noted. When testing the action of antiseptics on other organisms in the urine, it was necessary to obtain sterile urine, and to infect it with the organism in question. As it was thought that boiling might conceivably alter the composition of the urine and, therefore, be inadmissible, the urine was sterilized by passing it through a Pasteur-Chamberland filter. Jordan made a series of observations on the effect of *variations in the acidity of the urine on the growth of organisms*. And, according to the

<sup>1</sup> Biochemical Journal, vol. v, Nos. 6 and 7.

standard which he used, he found that the average acidity of twenty-four hours of urine over a period of five weeks was 3.9, the extreme variations being 3 and 5, and the average of the morning specimens being 4.3. By the administration of acid sodium phosphate the acidity could be raised to 8.9, and potassium citrate readily made the urine alkaline, to the extent of 2.5 on the scale which he used. A urine of average acidity undergoes putrefaction rapidly, becoming alkaline in twenty-four hours, and giving off free ammonia in two to three days. Jordan found that to stop putrefaction altogether, the acidity must be raised to 80 or 90, namely, seven to eight times as high as it is possible to raise it by giving drugs by the mouth. The growth of staphylococcus is favored by alkalinity, and is delayed by acidity, in the same manner as is putrefaction; and, according to Jordan, the only differences of importance are, that the staphylococcus is a little more active, and the experiments are more constant than those with the mixed organisms of putrefaction.

Interesting results were obtained with reference to the *influence of acidity and alkalinity on the growth of the Bacillus coli*. The *Bacillus coli* grows readily in sterile urine; a fine cloudy deposit appears which renders the urine uniformly turbid. According to Jordan, on shaking or stirring, peculiar glistening swirls are seen, and he states that this appearance is only seen in connection with the deposit in the case of the presence of the *Bacillus coli* and the *Bacillus typhosus* in the urine. Jordan states that in urine made much more acid or alkaline than is the case in the body, the *Bacillus coli* will still grow; and he states that no marked differences are to be observed in its rate of growth, whether the urine be acid or alkaline. The statement is often made that the *Bacillus coli* will not grow in alkaline urine, and the use of citrate of potash in large doses is looked upon by many as directly curative of *Bacillus coli* infections of the urinary tract, especially in children. Jordan points out that the *Bacillus coli* does not cause alkaline fermentation, consequently it is not possible to obtain any very simple indication of its rate of growth in the urine. He confined himself to observing whether it grew readily, or grew with difficulty, or not at all; and he states that until limits of acidity and alkalinity beyond those which occur in the body were reached, it was impossible to appreciate any differences in the rate of growth. He thinks it is possible that the statement often made, that this growth is inhibited by alkaline urine, is due to an erroneous assumption from the fact that the bacillus when growing alone tends to occur only in acid urine.

Jordan made a series of observations on urotropine, and he reviews to some extent the literature dealing with the mode of action of this drug. Several observers have demonstrated formaldehyde in the urine of patients taking urotropine, and they have attributed its antiseptic action to the formation of this substance. Others, however, have failed



to find formaldehyde, and have attributed the antiseptic action to urotropine itself. Jordan's work was performed with the object of clearing up these discrepancies, and experiments were made in which 10 grains of urotropine were taken three times a day, and acidity varied by taking at the same time acid sodium phosphate 30 grains, three times a day, or potassium citrate 1 dram, three times a day. These observations show that the antiseptic power of urotropine in alkaline or neutral urine was almost *nil*; but that, on the other hand, this power rises rapidly as the acidity increases; and when this is slightly above the normal standard, the urine will remain indefinitely sterile. Jordan noticed no differences of any importance in the case of different organisms; they were all affected in much the same way, and, as he states, these results can only be explained by the assumption that in the urines of higher acidity, an antiseptic of considerable power was present, which was absent from the urines which were alkaline or of low acidity. Jordan calculated, from the quantity of urotropine taken, that the substance present in the urine inhibiting putrefaction might be present to such a small extent as 1 in 10,000; and he quotes that Mosseau and Paleotti have shown that if formaldehyde is added directly to the urine it stops putrefaction when in the strength of 1 in 10,000, and that it has a definite antiseptic action even when present to the extent of 1 in 50,000. He points out that the substance present in acid urotropine urine corresponds closely in antiseptic power with formaldehyde. By direct testing of the urine with phloroglucin—a test sufficiently delicate to detect formaldehyde when present in a strength of 1 in 200,000—formaldehyde can be definitely recognized in these acid urotropine urines. Urotropine in solution is a relatively unstable substance. In acid solution it tends to form formaldehyde and ammonium compounds. In a dilution of 1 in 1000 and at the body temperature, urotropine in neutral solution yields formaldehyde to a very small extent, namely, about 0.05 to 0.1 per cent. In alkaline solution no decomposition occurs. In acid solutions the percentage of urotropine that breaks up increases considerably, and with an acidity corresponding to that of normal urine, about 10 per cent. might be split up in the formaldehyde.

In the case of sandal-wood oil, Jordan found that it had a very feeble effect in regard to restraining putrefaction, and that the *Bacillus coli* would grow freely in urine containing sandal-wood oil. But it has a marked effect in restraining the growth of the staphylococcus, and in alkaline urine sandal-wood oil has a greater action against staphylococcus than urotropine has. The power of salicylic acid was slight. It is more efficient against putrefactive organisms and the *Bacillus coli* than sandal-wood oil, but the latter is more efficacious in restraining the growth of staphylococcus.

The results may be summarized by saying that urotropine has no definite selective action on any particular organism, and owes its efficacy

to the formation of formaldehyde, but that sandal-wood oil would seem to have some selective action upon staphylococcus.

**Supernumerary Kidney.** Anomalies of the kidney are of sufficient frequency to be of importance, both to surgeons and physicians; and in some instances the anomaly is such as to predispose to or even to cause certain pathological changes. This is especially seen in cases of anomalies of the ureters. Abnormalities in the form or in the position of the kidney may lead to grave errors in diagnosis, owing to an abnormally placed but otherwise normal kidney being mistaken for a tumor. This may arise when a kidney occupies a position over the sacro-iliac synchondrosis, or when it is even lower in the pelvis, lying in the concavity of the sacrum, and being palpable *per rectum*. Dixon<sup>1</sup> records fully an example of one of the rarest anomalies, namely, the presence of a third kidney. This was observed in a subject in the dissecting room, in a male, aged about forty-five years, presenting no congenital anomalies beyond that associated with the kidney. On the right side the kidney was normal in all respects, but on the left side two kidneys of approximately equal size were present, lying one above the other, and separated by an interval of 2.8 cm. The upper one occupied the usual position of the left kidney, and the organ was normal in outline, and measured some 7.7 cm. in length. The pelvis, ureters, and blood-vessels were normal in position and arrangement at the hilum. The lower left kidney was approximately of the same size as the upper one, and occupied a position partly in the left iliac fossa, partly on the quadratus lumborum muscle, the middle point being on the level of the bifurcation of the aorta. The bloodvessels entered at, and the ureter issued from, a point on the upper and outer part of the posterior surface. The ureter of the upper kidney passed over the anterior surface of the lower kidney, and was joined at the upper pole of the lower kidney by the ureter of this kidney. Thus the ureter of the lower kidney had a remarkable course, in that it pursued an ascending path to reach its junction with the upper ureter. The left lower renal artery was derived from the left common iliac, and the renal vein opened into the vena cava inferior. The junction of the ureter with the bladder was normal. The peculiar relations of the vessels and ureter of the lower left kidney could be partly explained, according to Dixon, by assuming that its outer edge had been rotated forward and inward in such a way that the position of the hilum was directed backward. All authors are agreed that the presence of a supernumerary kidney is a very rare phenomenon, and some have even doubted the existence of this anomaly, being of the opinion that the older descriptions were capable of other interpretations. Dixon, however, has collected from literature the records of some 10 cases, some observed post mortem, and others during the course of

<sup>1</sup> Journal of Anatomy and Physiology, January, 1911, vol. xlv.

operative procedures. He has only included cases in which the proper kidney substance of the supernumerary organ was completely differentiated. According to Dixon, the cases may be divided into two groups—(1) those in which the supernumerary kidney was comparable in size to a normal kidney, though perhaps smaller, and (2) those in which the supernumerary kidney was very small and where it might even consist of but a single renal papilla with its pyramid and surrounding cortex. The majority of the cases described belong to the first group, only two belonging to the second; and it is curious that the supernumerary organ occurred seven times on the left side, and but once on the right among eight cases in which information as to the side affected is recorded. When we consider the readiness with which hydronephrosis is developed as a result and direct sequel of congenital anomalies of the ureter, it is certainly very remarkable that in the case described by Dixon there was no pathological change in the supernumerary kidney, notwithstanding the fact that the ureter followed such a devious course, first ascending and then descending. The explanation probably lies in the fact that although the course of the ureter was devious, the channel was not obstructed, and, therefore, no impediment was offered to the contractile renal pelvis.





# GENITO-URINARY DISEASES

BY CHARLES W. BONNEY, M.D.

## THE KIDNEYS AND URETERS

**Functional Diagnosis.** Functional renal diagnosis continues to be the subject of discussion, and several important papers concerning it have been published during the year. Rowntree and Geraghty,<sup>1</sup> who made a preliminary report on the *phenol-sulphone-phthalein test* in the summer of 1910, have published another contribution to the subject, giving the results of their experience based upon employment of the method in more than 200 cases.

Their first experiments were performed upon subjects whose kidneys, so far as could be determined by the ordinary methods of examination, were entirely normal. In such persons it was found that the drug appeared in the urine in from six to eleven minutes after its injection, and that from 40 per cent. to 60 per cent. of it was excreted during the first hour, and from 20 per cent. to 25 per cent. during the second hour. Consequently it was estimated that from 60 per cent. to 85 per cent. was eliminated during the first two hours. The standard quantity injected was 6 milligrams. When more than this was given it was found that the percentage of the drug excreted was smaller, but that the actual quantity was greater. Furthermore, it was observed that the intensity of elimination reached its height at a time varying from fifteen to twenty minutes after injection of the drug. At the end of an hour a gradual diminution is noticed, and at the expiration of two hours elimination is practically finished.

The authors do not attribute so much importance to the entire duration of the process of elimination as they do to the percentage of the drug excreted in a given time. In some other tests, the former was the sole criterion of total functional capacity. This they believe leads to erroneous conclusions, for the reason, so they state, that diseased kidneys, although eliminating less of a drug during the first hour after its injection than healthy ones, will eliminate as much during the second and third hours as they do in the first. In their earlier cases, only the time at which the drug first appeared in the urine, the time of maximum intensity of elimination, and the total duration of elimination were noted. Later in their work it occurred to them that the drug they were

<sup>1</sup> Annales Mal. des Org. Gén.-urin., 1911, vol. i, Nos. 4 and 5.

using would be very appropriate for colorimetric estimation, and so they began some observations concerning the latter with the Dubosq colorimeter, which, they state, has proved very useful. The method of using this instrument is described, and although the authors consider it simple, I doubt very much if many practical surgeons would deem it sufficiently so to make the estimations themselves, any more than they would undertake to make their own blood counts.

The test was applied, not only in cases of surgical affections of the kidneys, but also in cases of nephritis and in cases of urinary obstruction depending for the most part upon prostatic hypertrophy. As might be expected, the power to excrete the drug was decreased in the nephritides, particularly in the chronic interstitial form. Most interesting are the authors' findings in the cases of urinary obstruction. They state that the test enabled them to differentiate between those patients having serious renal involvement and those who were affected with only slight degrees of the same. Of the former class there were many who, although voiding practically a normal quantity of urine, which contained about the requisite percentage of urea and other solids, showed great reduction of renal permeability to phenol-sulphone-phthalein. When the appearance of the drug is delayed for more than twenty-five minutes, and less than 20 per cent. of it is excreted during the first hour, operation in these cases is postponed, regardless of the clinical condition of the patient. If the function of the kidneys improves sufficiently after appropriate treatment, operation may be resorted to. In not a single instance in which the test showed good renal activity were there any signs of renal insufficiency after operation. In this connection it is interesting to note that Casper<sup>1</sup> has recently been resorting to functional renal diagnosis in cases of prostatic hypertrophy, with the result that his mortality rate has been lowered.

Rowntree and Geraghty conclude that the phenol-sulphone-phthalein test is superior to any other at present employed for determining the functional capacity of the kidneys.

Others have also reported favorably upon it. Thus, Goodman and Kristeller,<sup>2</sup> who have used it in 58 cases, including those of 8 healthy men, summarize its advantages as follows: It does not decompose readily in solution and can be boiled. The dose is small, 1 cubic centimeter of solution containing 0.006 of the dye. The injection is painless and is not followed by irritation if the solution is sufficiently alkaline. The drug is entirely excreted by the kidneys. It appears in the urine in from three to ten minutes after the injection. From 50 to 75 per cent. is excreted during the first two hours. It lends itself to exact colorimetric measurement. The quantity recovered in a specimen within a given time is not influenced by the volume of the urine. Bile, pus,

<sup>1</sup> *Deutsche med. Wochenschrift*, 1910, No. 46.

<sup>2</sup> *Surgery, Gynecology, and Obstetrics*, January, 1911.



phosphates, and indican do not interfere with the colorimetric estimation of the drug.

John R. Caulk<sup>1</sup> also recommends phenol-sulphone-phthalein, because he believes it can demonstrate impairment of function when other tests fail. He condemns *methylene blue*, stating that it is altered in the system and excreted as a chromogen; and, furthermore, that only 50 per cent. of it is excreted by healthy kidneys. He thinks the same objection applies to *indigo-carmin*, of which he found only 25 per cent. to be excreted.

Paul Steiner<sup>2</sup> has carefully reviewed the various methods of functional diagnosis, and shows how the knowledge gained from them, when used in conjunction with that obtained from a careful chemical, microscopic, and bacteriologic examination of the urine, has produced better operative results. Of 34 patients operated upon for kidney disease, principally tuberculosis, during the two years prior to the publication of his article, not one succumbed to postoperative renal insufficiency. He thinks that the *phloridzin test* does not give trustworthy results in the early stages of disease, although in the advanced stages the results he obtained often coincided with the findings of the other methods. Concerning the *indigo-carmin test*, he expresses the opinion that it is of no greater value than some of the other methods in vogue.

After reviewing and criticising the various methods of functional renal diagnosis, B. A. Thomas<sup>3</sup> concludes that *chromocystoscopy* by means of the *indigo-carmin test* possesses the greatest advantages, inasmuch as it is easy of application, permits immediate conclusions to be formed, and obviates the necessity of ureteral catheterization. Rapidity of elimination and shorter duration of that process, together with the constancy of color reaction and intensity of color excretion, are secured by means of this dye. Figures are given to show that its elimination is more rapid and of shorter duration than that of phenol-sulphone-phthalein. The author believes that for the purposes of practical surgery it will suffice to make an accurate observation of the onset of elimination of the coloring matter. Tests depending upon simultaneous catheterization of both ureters are thought to be of limited applicability, for the reason, it is stated, that in those cases in which they are most needed it is often impossible to catheterize both, or even one ureter. The *phloridzin test* is considered less trustworthy than some others because it is very sensitive, gives variations in normal kidneys, and even fails to produce glycosuria in cases showing no pathological changes. *Electrical conductivity* is considered to be too complex for practical use, and cryoscopy is thought to be of value only when applied

<sup>1</sup> Interstate Medical Journal, December, 1910.

<sup>2</sup> Folia Urologica, December, 1910.

<sup>3</sup> Therapeutic Gazette, February, 1911; also Zeitschrift für Urologie, 1911, Band v. Heft 4.

to the urine obtained from each kidney separately, and then compared with the molecular concentration of the blood.

Tanaka,<sup>1</sup> who reports his experience with *indigo-carmin*, does not consider the test so simple and trustworthy, even when used in conjunction with ureteral catheterization. He states that, although he found the healthy kidney usually excretes the dye more rapidly than the diseased one, in some cases he observed the reverse to be true. The same irregularity was observed with reference to intensity of color. Therefore he is of the opinion that the renal function cannot always be accurately determined by this method alone. He lays stress upon the comparison of the color reaction of both kidneys, and enjoins great care in the introduction of the ureteral catheters, stating that they must be of the same size, be introduced the same distance, and be allowed to remain *in situ* exactly the same time. As to excretion of the dye, he found that, as a rule, 94 per cent. was excreted in from five to ten minutes; furthermore, that its excretion takes place more rapidly in the Japanese than in Caucasians.

Max Roth,<sup>2</sup> one of Casper's assistants, takes decided exception to the views expressed by Thomas concerning the *relative value of simple chromocystoscopy and bilateral ureteral catheterization*. He believes that the former cannot be safely used as a substitute for the latter, inasmuch as it furnishes no information concerning the structural changes of the kidneys, being solely an index of functional capacity and one subject to various errors even in that respect. Moreover, he declares it to be the most crude of all the functional methods of diagnosis, as it generally furnishes information only in well-advanced stages of renal disease. The results obtained with it in nephrolithiasis, however, may form an exception to the general rule, as they have sometimes proved more accurate than those obtained by any other method of examination.

It has been amply demonstrated that certain beginning structural changes in the kidneys are not associated with any disturbance of function, and therefore the point that the author makes concerning the diagnosis of such conditions by functional methods seems to be well taken. In such conditions, he states that double ureteral catheterization is the only means at our disposal by which accurate information can be obtained. He mentions two cases of pyelitis in which both clinical symptoms and cystoscopic picture pointed to chronic cystitis pure and simple, but in which catheterization of the ureters showed the presence of infection in the renal pelvis. This same absence of functional disturbance characterizes many cases of incipient renal tuberculosis, as well as some cases of renal tumors, both large and small, and the author believes that surgeon and patient alike will come to grief if

<sup>1</sup> Zeitschrift für Urologie, 1911, Band v, Heft 2.

<sup>2</sup> Ibid., Heft 6.

examination of the urine obtained separately from each kidney by the ureteral catheter be discarded in favor of any functional test.

The experience which he reports with the indigo-carmin test in renal tuberculosis is very interesting. It was employed in considerably more than 100 cases, and in about 20 per cent. of this number the time at which the dye first appeared and the degree of coloration it produced were just the same in the urine excreted by the diseased kidney as they were in that which came from the healthy one. In some of these cases cryoscopy and the phloridzin test showed a difference in the functional capacity of the two kidneys. In general, the author has observed that disturbances in the excretion of phloridzin take place earlier than disturbances in the excretion of indigo-carmin, but in nephrolithiasis, on the contrary, slight differences are sometimes noted in chromocystoscopic examinations when they are not revealed by the sugar test.

In all cases in which the indigo-carmin test is used the author is of opinion that the ureters should be catheterized, as the color intensity of the urine can be much more accurately determined if that collected from the two kidneys separately be compared in test-tubes than it can if it be estimated as the urine issues from the respective ureters into the bladder. He also points out that the color intensity of a small stream of urine would be greater than that of a larger one, and mentions the possibility of error arising from exactly such a source, inasmuch as the outflow of urine from the two ureters is shown to vary in health as regards size of the stream.

Concerning ureteral catheterization, the author states that insurmountable technical difficulties will be encountered in only an exceedingly small percentage of cases.

Whatever may be said concerning the relative value of the different methods, particularly those of chromocystoscopy, it is an undeniable fact that the modern methods of diagnosis, properly used and correctly interpreted, are capable of furnishing definite information as to the condition of renal capacity, and so much so that there is little if any excuse for deaths from renal insufficiency after nephrectomy. Further experimentation and observation may result in the settlement of certain differences of opinion which now obtain relative to the various methods.

**Rare Type of Unilateral Hematogenous Infection of the Kidneys.** George E. Brewer,<sup>1</sup> of New York, makes an important contribution to the study of a rare form of suppuration in the kidney. This paper, based upon 20 personal cases which were thoroughly studied, calls attention to an affection which he considers easy to diagnose if one bears the possibility of its occurrence in mind, but which otherwise may very often escape attention, and which, moreover, may progress quite rapidly to a fatal pyemia unless it be recognized and the proper intervention be made at once.

<sup>1</sup> Meeting of the French Surgical Association, October 6 to 8, 1910; *Revue de Chirurgie*, November, 1910; *Journal de Chirurgie*, November, 1910.



It is well known that in various benign infections, such as furuncles, coryza, influenza, and infected wounds, the causative microorganisms are freely excreted by the kidney, just as they are in more grave infections, such as typhoid fever, for instance. If the microbes are virulent and present in large numbers, instead of giving rise to a mild nephritis they may lead to the production of localized tissue changes which vary from a slight degeneration in a previously healthy kidney to complete suppuration or gangrene in one already injured by disease. These gross changes produce conditions which are easily diagnosed, but in another class of cases, the one to which the author especially calls attention, there is a type of infection in which, because of the virulence of the infecting microorganisms or the slight resistance of the patient, the renal changes are immediately followed by a toxemia so profound that it may be confused with pneumonia or other severe infectious disease, and in which the local symptoms are so slightly manifested that a most careful physical and clinical examination is necessary to reveal the true nature of the trouble. Several cases are mentioned in which death occurred within a few hours and in which the autopsy showed a number of localized infarcts in one kidney. Lumbar nephrotomy, which was employed by Brewer in 4 of these cases, failed to arrest the fatal progress of the disease. Consequently, in 10 other cases he was led to perform nephrectomy. The outcome of these cases was favorable. One of them is of sufficient interest to bear repetition here. It was that of a woman, aged twenty-eight years, who had been entirely well prior to this attack of illness, which came on rapidly, and was accompanied by a chill with very high elevation of temperature, and pains in the back and limbs. She was treated for malaria, but examination of the blood did not show the presence of any plasmodia. Careful physical examination revealed a slight downward displacement of the right kidney, the area over which was sensitive to pressure. The urine analysis was negative. As the fever continued and the prostration became greater, nephrectomy was performed under chloroform anesthesia. The kidney was found to be very edematous and contained thousands of very small infarcts. Convalescence was rapid, and several years after the operation the patient went through an attack of scarlet fever, accompanied by a very marked albuminuria, without sustaining any serious accident. At present she is in perfect health.

A number of analogous cases are narrated, in some of which such diagnoses as appendicitis, abscess of the liver, acute intestinal obstruction, etc., had been made. In the 14 cases which Brewer has observed, 2 patients who were not operated upon succumbed within twelve days; 4 upon whom nephrectomy with drainage was performed died shortly after the operation; the remaining 8, who were treated by early nephrectomy, recovered.

In addition to reporting these cases and describing them from the

clinical standpoint, Brewer describes the results obtained by experimental investigation, which show very forcibly the influence of a previous traumatic inflammatory lesion. He also reports several other cases of rather benign type which resembled appendicitis or cholecystitis more than those of the fulminating type, and in which decapsulation is sufficient to effect a cure. The most pathognomonic sign in such cases is considered to be a very marked sensibility in the affected area just at the junction of the rib with the spine. It is easy to detect, if the possibility of its presence be thought of, and once being found, will invariably guide the surgeon in the making of a correct diagnosis.

It is interesting to note that Brewer considers unilateral hematogenous infection of the kidney as the possible cause of some of the inexplicable accidents which occasionally take place after appendicitis operations. In support of this belief he cites the following case: A woman, aged forty-six years, was operated upon in May, 1906, for subacute appendicitis. During her convalescence, which had been normal in every respect, she suddenly complained of headache and pain in the back and lower limbs. She soon developed chills and fever. The wound had healed perfectly. There were no lesions in the throat or ears, and examination of the heart and lungs was negative. A careful examination of the abdomen, however, showed a decided sensibility to pressure at the left costovertebral angle. Examination of the urine revealed a trace of albumin, a few red blood cells, and some leukocytes. By catheterizing the ureters the presence of an acute localized inflammation of the left kidney was determined, the signs of which persisted in greater or less degree for several months.

**Gonococcic Infection of the Kidney.** F. R. Hagner<sup>1</sup> reports a case of gonococcic infection of the kidney, and analyzes 9 cases which he collected from the literature, this number being all that he could find in which there was no question as to mixed infection.

His own case was that of a man, aged thirty-five years, who ten years before had had a mild attack of gonorrhea which was apparently soon cured. In September, 1909, he consulted Hagner for a pyuria of six weeks' duration, which was accompanied by severe pain in the right lumbar region, over the bladder, and in the right groin. It was found that there was some swelling of the prostate gland and seminal vesicles, and these organs were then treated, with the result that local improvement took place. The pyuria, however, persisted, and consequently a cystoscopic examination was made, which revealed a slight inflammation around the right ureteral orifice. Double catheterization showed that the pus came from the right side only. Cultures were made from the urine from the right kidney, and the gonococcus was found to be the only microorganism present. After four irrigations of the renal

<sup>1</sup> Medical Record, October 1, 1910.

pelvis with the nitrate of silver solution, 1 per cent., the purulent renal secretion had almost completely ceased and the pain had greatly diminished.

Commenting upon the cases which he has studied, Hagner states that a pure gonococcic pyelitis may not be so rare as the majority of writers seem to think. He also advises that a most careful bacteriological examination of the urine, obtained separately from each kidney, be made in cases of chronic pyuria which accompany chronic gonorrheal infection of the urethra or its adnexa. He considers treatment to be very satisfactory, once the diagnosis has been made.

Nixon,<sup>1</sup> of Baltimore, has also seen 2 cases of gonococcic infection of the kidney, both of which were in women. The first case was that of a woman, aged twenty-two years, who had suffered for several years with chronic urethral and vaginal discharge, and also experienced pain over the left kidney. Although her urine would become turbid at times, she had never suffered from any disturbance of micturition. Cystoscopic examination showed the bladder to be normal, except for slight redness around the left ureteral orifice. The urine which was discharged from this orifice was purulent. Microscopic examination of pus revealed the presence of numerous coffee-bean-shaped diplococci which were negative to Gram's stain. No tubercle bacilli could be demonstrated. The left kidney was cut into and a large abscess evacuated. The patient made a good recovery, although a fistula persisted. The cultures taken from her pus gave a pure growth of gonococci. It is interesting to note that a second operation, subcapsular nephrectomy, was deemed necessary, and that tuberculous lesions of the kidney were found, from which the bacilli of Koch were recovered. Evidently the case was one of mixed infection, both gonorrheal and tuberculous. Such a lesion in the kidney only serves to accentuate the importance of chronic gonorrhea as a predisposing factor in tuberculous infection. In view of the rarity of gonorrheal infection of the kidney, this superimposed tuberculous infection impresses one as being of great interest.

The second case was that of a woman, aged forty-eight years, who also presented symptoms of chronic gonorrheal infection. She had a profuse purulent vaginal discharge, and also suffered from painful micturition. For several years she had been subject to attacks of severe pain over the left kidney, at which time her urine would become purulent and she would develop fever. Cystoscopic examination showed the bladder to be normal, but revealed pus issuing from the left ureter. Bilateral ureteral catheterization was practised, with the result that the quantity of urine secreted from the left kidney was found to be much less than that which came from the right kidney. It also contained only 2 grams of urea and was heavily laden with leukocytes.

<sup>1</sup> Surgery, Gynecology, and Obstetrics, April, 1911.



The left kidney was removed. It contained several small superficial abscesses and the parenchyma showed signs of sclerosis. The mucous membrane of the pelvis was thickened, the pus from the abscesses showed a coffee-bean-shaped diplococcus negative to Gram's stain and presenting all the characteristics of the gonococcus. There were no tubercle bacilli present.

**Tuberculosis.** In a very interesting contribution to the subject, Kümmell<sup>1</sup> discusses the etiology, diagnosis, and treatment, both operative and specific, of renal and vesical tuberculosis, and gives the results obtained in 125 cases in which operation, either nephrectomy or nephrotomy, was performed. Some of his cases were undoubtedly primary, in which the kidneys and bladder alone were found to be diseased. In others, the affection was demonstrated to be secondary, having taken place from lesions in the lungs, the lymph nodes, and in one case from a tubercle on the finger. That better knowledge of the *etiology* of the disease has been productive of a more rational and successful treatment, is clearly demonstrated by the author, who calls attention to the fact that so long as tuberculosis of the kidneys was considered the result of ascending infection from the bladder, it was only under exceptional circumstances that successful operative interference was deemed feasible. The occasional occurrence of vesical infection from lesions in the genital organs is, of course, admitted, but in case of such isolated morbid processes it is always to be assumed that disease of the kidney is present, for the reason that a thorough examination has invariably shown the double lesions to have originated from separate primary foci.

Of particular significance is the statement that in those more frequently operated cases of tuberculosis of the female genital organs resulting in extensive involvement of the peritoneum, together with ascites, scarcely a case was observed in which the bladder had not become invaded unless there was also disease in the kidney.

Perhaps the most instructive part of this valuable paper is that devoted to *diagnosis*, which must be made very early, if the best results are to be obtained.

The earliest stage of the disease is designated as that in which the subjective symptoms do not refer to the seat of the trouble, and in which such objective diagnostic signs as enlargement and tenderness of the kidney are not present.

The *pathological changes* are principally confined to the kidney, the ureter and bladder being either uninvolved, or if so, only in the slightest degree. In this stage trivial symptoms referable to the bladder may be complained of, or the patient may notice that the urine is cloudy and consult the physician about it. These disturbances of the bladder may be attributed to disease of the pelvic organs, and the real source of the

<sup>1</sup> Surgery, Gynecology, and Obstetrics, April, 1911.

trouble remain unsuspected. Here tuberculosis should always be thought of as a possible cause, and frequent and thorough examinations of the urine should be made. As gonorrhea is a frequent predisposing cause of genito-urinary tuberculosis in both sexes, adequate etiological importance should be attached to a lingering infection. Especially in chronic gonorrheal cystitis should the urine be examined for the tubercle bacillus, as well as for the Neisserian organism and the bacteria of suppuration. In these early cases the most constant and distinctive sign is cloudiness of the urine, and although repeated examinations are often required before the tubercle bacillus can be demonstrated, patience will be rewarded by a positive finding. Animal experimentation is also considered helpful in this respect, the urine being injected into the peritoneal cavity of guinea-pigs according to the usual method obtaining in such cases.

The presence of the bacillus, however, proves only that we have to deal with tuberculosis of the urinary organs. Whether it be a primary lesion of the kidney or a secondary and more or less widely disseminated disease of the bladder, the source of which is the kidney, or whether one or both kidneys are diseased, is not known and cannot be learned by the ordinary clinical methods. The cystoscope, however, especially the catheterizing instrument, overcomes this difficulty. In the early cases, before the bladder has become involved, catheterization of the ureters makes accurate diagnosis possible. The functional capacity of the other kidney is determined, and thus a good result is insured by the removal of the more diseased of the two organs in cases in which the other kidney is found able to carry on the work of the organism.

The author agrees with those who maintain that practical experience has not borne out the theoretical objection that there is danger of infecting the kidney by ureteral catheterization. Chromocystoscopy, although considered an advance in diagnosis, is not thought to be a safe substitute for ureteral catheterization, and this, I believe, would be found to be the consensus of opinion of those best qualified to judge of the matter. In some cases its results were inconstant. Thus, upon some occasions the excretion of the dye from the more diseased kidney would be delayed for hours, whereas upon other occasions it would be excreted in about fifteen minutes. The method is considered of most value in advanced cases in which tissue changes have obscured the ureteral orifices.

Besides the more common methods of determining the functional capacity of the opposite kidney, *cryoscopy*, and especially the *determination of the freezing point of the blood*, were found of great help. This is especially valuable in bilateral cases. In this class, if the freezing point of the blood be below  $0.6^{\circ}$ , operation is not refused the patient, even though other circumstances would seem to contraindicate it. Instead of nephrectomy, however, a nephrotomy, with removal of the

tuberculous masses, is done. It has been found that the other relatively healthy kidney will then in course of time take up the work of the badly diseased one, as shown by the return of the blood to a normal freezing point. When this condition is reached, the badly diseased kidney can be removed. Patients thus treated enjoyed relatively good health for a year and longer. In those cases in which it was impossible to catheterize the ureters, or even pass the cystoscope on account of contracted bladder, excessive ulceration, uncontrollable incontinence, etc., the suspected kidney was laid open after the freezing point of the blood had been determined to be normal, and, if it was widely destroyed, nephrectomy was done. If the freezing point of the blood was below  $0.6^{\circ}$ , nephrotomy was performed in the same manner as in the previously mentioned class of cases. Later, the same treatment accorded patients of the previously mentioned class was applied to those of this one. It is interesting to note that Kümmell has frequently been able to catheterize both ureters when the capacity of the bladder was very small, namely from 50 to 80 c.c.

The following results were obtained in 125 operative cases. Seven nephrotomies were done on account of advanced double-sided disease, one woman even having a double nephrotomy. There were 118 nephrectomies performed, of which 12 were done before the modern methods of diagnosis were employed. The mortality of these 12 operations was 25 per cent. Of the 106 nephrectomies performed after catheterization of the ureters and estimation of the functional activity of the kidneys was routinely employed, there were only 4 deaths. Within the first six months after operation, 18 patients succumbed. In the course of the next two to four years, 18 of the remaining 84 died. In the course of the next ten to thirteen years none have died. Three others have died, however, but the time at which death took place is unknown. No reports could be obtained from 4 patients. The remaining ones are still in good health. Three of the females have become pregnant and been delivered. Twenty-five patients are still under treatment.

These results certainly afford striking evidence of the value of early surgical treatment, and the necessity of an early diagnosis to render the latter possible.

Concerning the *tuberculin treatment*, the author expresses the same opinion that he expressed at the meeting of the Deutscher Naturforscher und Aerzte at Königsberg in September, 1910, when he announced that he had rejected tuberculin. He then stated that the circumstance of recovery taking place under tuberculin dose not prove the cure to be due to that substance, for, while in some cases recovery takes place without any treatment whatever, in 4 cases treated for a long time with tuberculin he found marked tuberculous lesions in the kidney either at operation or autopsy; and he properly remarks that the advocates of tuberculin therapy are not in a position to show what the structural condi-



tion of the kidney is. In children affected with unilateral tuberculosis he makes an exception to this general rule, and tries tuberculin for a while.

In a paper read at the last meeting of the French Surgical Association, David Newman,<sup>1</sup> of Glasgow, carefully considered the early diagnosis of renal tuberculosis. He cited some cases in which the true nature of the trouble might easily have escaped detection had not the most painstaking examinations been made. These examinations included not only the modern physical methods of diagnosis, but in some instances, involved repeated experimental inoculations of animals.

Polyuria and increased frequency of micturition unassociated with pain, persistent slight pyuria and albuminuria in acid urine which does not show casts, together with occasional attacks of slight hematuria, are regarded as premonitory signs which should lead the surgeon to make a most thorough investigation of the patient's condition. Remission of these symptoms is considered very characteristic of early tuberculosis.

Great reliance is placed upon the findings of simple cystoscopy in these cases, inasmuch as the author believes that changes at the ureteral orifices are among the earliest objective manifestations of tuberculosis of the kidneys. Consequently ureteral catheterization is not resorted to *unless other methods fail to supply positive information*. This qualification of the author's views on the value of simple cystoscopy would seem to be a most judicious one, for the reason that practical experience and theoretical considerations combine to render the use of the ureteral catheter highly desirable in some of these self-same early cases which the author so ably discusses. Certainly the kidney is diseased before the ureteral orifice is affected, and also may secrete purulent urine for some time before any changes are wrought at the site of the latter. Under such circumstances ureteral catheterization will be a most valuable diagnostic measure, as it will supply urine from the respective kidneys for microscopic study, culture methods, and inoculation experiments. The author is no doubt correct, however, in stating that sufficient attention has not been paid to the condition of the ureteral orifices in this disease.

A certain value is attributed to the ophthalmotuberculin reaction, although it is by no means regarded as an *absolute test*.

Nephrectomy is considered the proper treatment, and the author believes that it should be advised even in those cases in which the patients suffer so little inconvenience as to make it difficult to convince them of the necessity of surgical intervention. Like many others who have studied the subject, the author admits the possibility of spontaneous healing of the tuberculous lesions, but believes such an outcome to be

<sup>1</sup> Practitioner, July, 1911.

so rare that it should not be considered in the making of a prognosis. Few, if any, will disagree with his statement that a large proportion of patients not subjected to operation go on from bad to worse.

J. Borelius<sup>1</sup> has investigated the results of 25 nephrectomies which he did for renal tuberculosis. In this series only two surviving patients were included in whose cases at least one year had not elapsed since the date of operation. Seven of the patients died, and of this number all but one succumbed to tuberculosis within the first year. Concerning the seventh, who died at the end of three and one-half years, no definite data could be obtained. Three of the patients were subjected to autopsy, and in two of them the other kidney and ureter were found healthy. In the other one the kidney was found normal, but the ureter was diseased.

If the two patients operated upon within less than a year be excluded, there are 16 remaining from whom observations can be made. Of these, 9 have been in perfect health for periods varying from one to five and one-half years. Two of the remaining 7 still have some albuminuria, 4 still have some cystitis, and 1 has a fistula. All of the 7, however, have been much benefited, and the author hopes they will be cured.

It is very significant to have the author state that the results were the least satisfactory in those cases in which he anchored the ureter in the lower angle of the wound. Usually he divided it low down, between two ligatures, and cauterized the stumps to prevent infection of the adjacent tissues. Like all other surgeons of experience, the author states that early operations give the best results, and advocates more accurate diagnoses in order that treatment can be given at a time when it may be productive of cure.

**Fever in Renal and Perirenal Tumors.** Israel<sup>2</sup> has observed that fever is not uncommonly an early symptom in cancer of the kidney. Since 1895 he has seen it in 19 cases, irrespective of those in which it occurred as a manifestation of suppuration. According to his statistics, it is present in 8.2 per cent. of all early renal tumors. It may manifest itself even before there is a palpable tumor, or develop simultaneously with the appearance of the latter. It may last during the entire course of the disease, or it may terminate definitely after being present for a variable period of time. It may also be of the recurrent type. If the tumor can be completely removed, fever does not recur, but, if only partial removal is practised, it may persist. In certain cases, recurrence of the growth was accompanied by a redevelopment of fever.

The author is unable to explain the cause of this elevation of temperature, but states that it is certainly not of bacterial origin. Neither

<sup>1</sup> Nordiskt Medicinskt Arkiv. Festschrift tillägnad Prof. J. Berg, 1911, vol. xlv, No. 1.

<sup>2</sup> Deutsche medicinische Wochenschrift, January 12, 1911, tome xxxvii, No. 2.

does he consider it to be dependent upon any process of tissue destruction.

**The Danger of Operation for Renal Calculi.** Rafin,<sup>1</sup> of Lyons, has made a careful statistical study of the dangers attending surgical intervention for renal calculi, comparing his own results, based upon 43 cases, with those of other surgeons. Of his 43 patients, 5 died, which gives a mortality rate of 11.6 per cent. All of these fatalities occurred in infected cases, of which there were 26 in all. Nephrectomy was done fourteen times, without a death. Nephrotomy, fifteen times, with 5 deaths. Four of the patients in this group suffered from bilateral nephrolithiasis. Three of them died. A comparison of the author's statistics with those of other well-known renal surgeons, including Kümmell and Israel, shows that his mortality rate is practically the same as theirs. It seems to vary from 10 to 12 per cent. In the cases in which infection has not occurred, the total mortality rate, based upon 287 operations, was 4.5 per cent. It is not surprising that the author's investigation shows the mortality rate of nephrotomy in infected cases to be considerably higher than that of nephrectomy (18.4 per cent. for the former, and 5.3 per cent. for the latter). The greater danger incident to nephrotomy is probably due to a variety of conditions, such as greater technical difficulty, danger of secondary infection and hemorrhage, and to the circumstance that it is the operation of necessity in cases in which the functional value of the other kidney is so poor as to render removal of the more diseased organ precarious. The author's paper is a very complete one and is well worth careful study in the original by all who are specially interested in this subject.

With reference to *nephrotomy for lithiasis*, a communication by Howard A. Kelly,<sup>2</sup> of Baltimore, is of interest. He describes a transrenal method which he considers quicker and safer than an ordinary pyelotomy except in the simpler cases in which exposure is very easy. It is performed as follows:

"A renal catheter, 1.75 mm. in diameter, large enough to obturate the ureteral orifice and prevent a reflux of fluid into the bladder, is inserted through an open-air cystoscope and introduced well up to the kidney just before giving the anesthesia.

"The patient is then put to sleep, preferably with gas, semiprone, on an Edebohls cushion. An incision is made in the loin and the superior lumbar triangle is pulled open, and the kidney exposed and freed on all sides from its fatty capsule.

"The stone is then felt and the kidney gently loosened as far as possible on all sides and brought toward the wound. Then an assistant forces fluid ( $\frac{1}{2}$  1.0% silver nitrate) into the renal pelvis, until it puffs out

<sup>1</sup> Lyon Chir., April 1, 1911.

<sup>2</sup> Journal American Medical Association, July 1, 1911.



tense. As a rule, with a careful preliminary study, the exact capacity of the renal pelvis is already known. Then when the pelvis and kidney are swollen up tense, the surgeon first incises the capsule and then plunges a blunt-pointed and blunt-edged knife through the cortex on the posterior surface, easily entering the renal pelvis at once and enlarging the incision, in a transverse direction if the stones are small. There is a gush of fluid which stops as he introduces his finger and feels for and finds the stone, which he at once grasps with a small stone forceps and removes.

"The calices and the mouth of the ureter are now examined for more stones, and the kidney is palpated on all sides with both hands, one finger being inside the renal pelvis. After all stones are removed, the wound is plugged or held closed, while the pelvis and the calices are again distended with the silver solution, when the finger is suddenly withdrawn, letting the fluid escape with a rush, bringing any small calculous debris with it. This may be repeated several times."

**Remote Results of Thirty Operations for Movable Kidney.** A. Rendle Short,<sup>1</sup> of Bristol, England, has analyzed the cases of movable kidney which were operated upon at the Bristol Royal Infirmary from 1900 to 1909. There were 38 in all, but only 30 in which sufficient time had elapsed for any conclusions to be drawn. All of these cases were in females, whose ages varied from twenty-two to fifty-eight years. In every case except one it was the right kidney that was displaced.

Three methods were employed. In the early cases, nephropexy by means of interrupted sutures, first passed through the cortical substance of the kidney itself and then through the muscles of the lumbar region, was used. Of these there were 14. In the next 9 cases the capsule of the kidney was detached and fixed to the muscles by sutures of catgut or kangaroo tendon. In the remaining 8 cases, the kidney was entirely liberated from its fatty capsule, and pure carbolic acid was applied to its surface, after which a strip of iodoform gauze was passed beneath its inferior pole in such a manner as to lift it up. The two ends of this gauze were then drawn out of the wound and fastened to the dressing. The hammock thus formed was left in place for two weeks.

Judging from the results obtained in these cases, the last method proved the most satisfactory, as there were 5 cures out of the entire number in contradistinction to 3 obtained in the second series and 9 in the first. They are so few in number, however, that definitive conclusions cannot be drawn from them.

It is my belief that Edebohls' method of nephropexy will give as good results in a considerable number of cases as any method thus far devised. Some surgeons, however, who formerly used that method, have given it up for others in which the kidney is suspended by means of

<sup>1</sup> British Medical Journal, March 25, 1911.

a gauze sling in a manner similar to the third method tried by Mr. Short. The application of carbolic acid to the surface of the kidney would seem to be an heroic measure, and one which might not be necessary if the surface of the kidney were rubbed briskly with gauze. If the latter procedure be resorted to, I believe it would excite sufficient irritation to cause adhesions to form between its surface and the tissue with which it is brought in contact.

The author also considers the advisability of operating for movable kidney, and expresses the opinion, which is in accord with the best surgical judgment of the times, that operation should be done only in those cases in which marked symptoms are present, and in which, moreover, it seems reasonably certain that they are due to no other conditions than the displacement of the kidney. Some of the failures to bring about relief he attributes, and very justly so, I believe, to the mistake of considering various disturbances dependent upon floating kidney, when in reality they are due to conditions entirely independent thereof.

**Different Methods of Converting the Urinary Flow into the Intestines and Their Remote Results.** S. R. Mirotvortzeff<sup>1</sup> has written a very critical review of the different methods of implanting the ureters into the intestine. The operation may be done in four classes of cases, namely; in malformations of the bladder, such as exstrophy and absence of the internal sphincter; in ureterovaginal or vesicovaginal fistulæ so extensive that they are inoperable; in inoperable malignant disease, and even in certain cases of benign neoplasms; and finally, in cases in which the ureter has been injured during an operation, when it is not deemed advisable, or is impossible, to suture it into the bladder again.

The author has collected 162 cases in which the trigonum was implanted into the bowel for malformation of the bladder. In this series there was a mortality of 32 per cent. He was able to trace 9 patients who were living at the time that his investigation was being made. Of this number, there were 2 who had been operated upon seven years before; 4 who had been operated upon nine years before, and 1 who had been operated upon ten, eleven and one-half, and twelve years respectively. While these 9 cases prove that a fatal ascending infection of the kidney is not a necessary sequel of the operation, it would certainly be most interesting and instructive to get some data concerning the other 101 patients upon whom the procedure was practised. I cannot but believe that some of them may have succumbed to a colon bacillus infection of the kidney within a few years from the date of their operation, and I certainly am of the opinion that exstrophy of the

<sup>1</sup> Travaux de la Clinique du Prof. Oppel, 1910, tome i; also Journal de Chirurgie, May, 1911.

bladder or any other defect of development exposes the patient to less danger, even if greater inconvenience, than implantation either of the trigonum vesicæ or the ureters into the intestine.

Out of 78 cases in which both ureters were implanted into the bowel, there were 30 deaths. The operation was done thirty-two times for malignant disease, and in this series of cases there were 24 deaths. Of these fatalities, 44 per cent. were due to peritonitis and 20 per cent. to pyelonephritis. In 29 cases in which Tichoff operated for vesico-vaginal fistula, there were 9 deaths, and of 8 cases operated upon in Oppel's clinic, there were 4 deaths; 5 of these 8 cases were malignant, and the 4 patients who died belonged to this latter group. The other 3 were cases of malformation of the bladder. It is interesting to note that the 4 fatalities occurred in the patients suffering from malignant disease.

The technique of the operation employed, both by the author and his chief, as well as by Tichoff, is described in detail. In cases of vesical tumor the author advises against removal of the bladder at the same time that the ureters are implanted into the bowel, as such a procedure greatly increases the danger of operation. The statistics which are given show that at best this operation is one which is fraught with great danger. Personally, I believe that it is rarely, if ever, a justifiable procedure.

Even in cases of advanced malignant disease of the bladder, in which for any reason an attempt at radical cure is undertaken, I would consider Watson's method of making a double urinary fistula in the loins to be much preferable.

The uniformly disastrous results obtained from uretero-intestinal anastomosis in animals are well known. Although a better technique has reduced the immediate mortality of these experimental operations, which has been as high as 100 per cent., even the latest series of experiments show both high mortality and evil consequences in the few which survive.

About one and one-half years ago Bela von Rihmer published the results of his work upon animals. Of those upon which implantation into the rectum or sigmoid was practised, 6 survived the operation. After they died a natural death or were killed, as the case might be, it was found that there was an ascending renal infection in every one. Two forms could be differentiated, one of which had produced suppuration, the other a non-suppurative nephritis of variable degree, amounting in some instances to typical contracted kidney. The former was found to develop as the result of contraction of the new opening and the consequent dilatation of the ureters and renal pelvis, whereas the latter, which was observed in cases in which the new opening remained patulous, was attributed to prolonged action of the colon bacillus and its products.



**Inflammation of the Fatty Capsule of the Kidney.** This subject has been investigated by Bussemius and Rammstedt.<sup>1</sup> In paranephritis a purulent softening is generally thought to follow inflammation of the connective tissue of the kidney. From the observations which they made, however, the authors believe that the non-suppurating form of paranephritis occurs more frequently than is generally supposed. Etiologically, three forms of inflammation of the cellular tissue of the kidney are differentiated: the traumatic, the metastatic, and that due to extension or continuity of the morbid process. As the result of traumatism, small extravasations occur in the fatty capsule and microörganisms settle there. Inflammation of the cellular substance of the kidney are propagated from purulent renal collections due to tuberculosis, actinomyces, stone in the kidney, echinococcus, and bacteriuria; from psoas abscess and inflammations of the liver or gall-bladder; from all wandering disease processes with retroperitoneal inflammation, and from inflammation of the organs of the chest. Metastatic inflammations arise in persons suffering from furunculosis, inflammation of the nose, throat, and tonsils, and from peripheral pus collections.

The onset of this condition is sudden and is accompanied by high fever together with digestive disturbance. A sudden localized pain is characteristic. Its location, however, is variable, depending upon the site of the inflammation; thus, it may be in the gastric or hepatic region, alongside the vertebral column, below the ribs, in the loins, or above the hips. Tenderness can always be elicited below the twelfth rib in the region of the affected kidney. After a time a prominent swelling appears in the lumbar region and a scoliosis may develop, the convexity being toward the affected side. In thin subjects, a mass can be felt filling the lumbar region. In most cases, suppuration ensues. The pus may find its way through the diaphragm into the thorax and be discharged by way of a bronchus, or it may perforate into the large or small bowel, the urinary tract, or the vagina. While it has been taken for granted that a paranephritic inflammation does not occur without suppuration, yet the author observed three cases which healed spontaneously without any pus formation. In these cases there was a striking similarity in the cause, symptoms, and course of the disease. First there occurred pain in the left breast, then stabbing pain and swelling in the region of the left kidney. With an increase in the swelling, a scoliosis and painful rigidity of the vertebral column developed. This appeared to be undoubtedly a lumbar abscess, yet repeated punctures failed to detect any pus.

The diagnosis of paranephritis is easy when the posterior fatty capsule is affected by the suppurative form. The differential diagnosis is at first extremely difficult when the inflammation is limited to the

<sup>1</sup> Mitteil. a. d. Grenzgeb. d. Mediz. u. Chir., Band xxii, Heft 3.

superior or inferior pole of the capsule on the surface facing the abdominal cavity. A pneumonia or pleurisy may be simulated, or if there is severe abdominal pain, especially on the right side, an appendicitis may be suspected. The presence of blood and pus in the urine would indicate that the kidney itself is affected, and thus a pararenal affection might remain undiagnosed for some time. Furthermore, the differentiation from tumors of the kidney, hydroponephrosis, and subphrenic abscess must be considered. The treatment of this condition is mostly symptomatic. If the fever increases and the patient begins to lose strength rapidly, operative measures should be instituted immediately.

**Congenital Stricture of the Ureter.** J. T. Bottomly,<sup>1</sup> of Boston, has made a very thorough study of congenital stricture of the ureter, which, it would seem, is not as rare as it has generally been considered. He succeeded in collecting 56 authentic cases from the literature and from personal communications. Of these 56 cases, 25 were in men and 16 in women; in the remaining 15 cases, the sex of the subjects is not stated. In 11 cases, the strictures affected supernumerary ureters. As to the etiology of this condition there has always been a difference of opinion, some having considered the stricture due to a malformation while others have regarded it as the result of inflammation. A portion of the ureter may be entirely obliterated; in other cases, however, the constriction is localized at one extremity. In the latter case, the rest of the ureter is either dilated or distorted. Sometimes the lower extremity becomes much dilated and projects into the bladder like a cyst. The condition of the bladder and pelvis of the kidney is most variable. Sometimes there is a large hydronephrosis present, while in other cases the kidney is much atrophied. Between these two extreme conditions there are several intermediate ones. The symptoms are extremely variable, so much so that it is impossible to describe them accurately. One thing that is most constant, however, is disturbance in micturition. If hydronephrosis be present, then an internal abdominal tumor is easily detectable. Ordinarily the urine is normal and there is no fever unless infection occurs.

The case which the author reported was that of a boy, aged six years, who, a year before, had suffered with an acute attack similar to that for which he was admitted to the hospital. For four or five days before admission he complained of abdominal pain and vomiting. The pain soon localized itself in the right lumbar region. There were no signs referable to the urinary tract; neither was there rigidity of the abdominal wall. His temperature was 38.5° C.; pulse, 120. Upon palpation, a soft sausage-shaped mass was found in the right lumbar region. Although there was no discharge of bloody mucus from the bowel, it was thought probable that the boy was suffering from an intussus-

<sup>1</sup> *Annals of Surgery*, November, 1910.

ception. Operation, however, revealed a hydronephrosis of moderate size and a dilated ureter as large as a coil of small intestine. The kidney and ureter were removed, with the result that the child made a good recovery. It was found that there was a fold suspended over the ureter 1.5 cm. above the vesical orifice. In this case there was nothing which would have enabled one to make a correct diagnosis, and the same statement is true with reference to the cases which Bottomly collected. The treatment of choice is considered to be removal of the kidney and ureter. In a few cases in which there is dilatation of the ureter just beyond the bladder it may be possible to do a ureterocystostomy.

**Two Cases of Cystic Dilatation of the Vesical Ends of the Ureters.** M. Pietkiewicz<sup>1</sup> has reported 2 cases of cystic dilatation of the lower ends of the ureters, together with prolapse of the same into the bladder. Both cases were due to a congenital stenosis of the ureteral orifice. Operation was practised in both, with the result that cure was obtained.

The first case was that of a woman, aged thirty years. There was nothing important in her previous history. A few days before she was admitted to the hospital, micturition was suddenly arrested. In the evening prior to her admission, while lifting a heavy box, she felt a sudden violent pain in the lower part of the abdomen, and in the right inguinal region, and at the same time a mass appeared between the lips of the vulva. This seizure was followed by an attack of unconsciousness which lasted for three hours. When the patient recovered, she complained of painful and frequent micturition and considerable strangury. Upon examination, it was found that there was no rigidity of the abdomen and that the kidney could not be palpated. Her temperature was 38° C.; her pulse, 120. Pain in the lumbar and inguinal region was still present. A spheroidal tumor the size of a plum presented at the vulva. In color it was deep red, and was dotted here and there with black spots, evidently due to necrosis. Further examination showed that it came out of the ureteral orifice. Its nature could not be determined, and so it was at once reduced under general anesthesia. As soon as it had been pushed back into the bladder a large quantity of urine flowed out. A catheter was fastened into the bladder and left there a few days. The fever continued for a number of days. On the fifth day subsequent to the reduction of this tumor a cystoscopic examination was made. A large tumor was seen on the floor of the bladder almost obliterating the trigonum. The adjoining mucosa was hyperemic and edematous, but otherwise normal. The left ureteral orifice was so small that it could hardly be detected. It seemed to pout out into the bladder like a little cone. A very small jet of urine was discharged from it at short intervals. A suprapubic cystotomy was decided upon. At operation the vesical tumor was found to be a cystic dilata-

<sup>1</sup> Zeitschrift für Gynecologische Urologie, May, 1911.



tion of the right ureter. It was cut off at its base and its margins sutured with catgut. Cystoscopic examination made three months later revealed normal mucous membrane and a ureteral orifice normal in shape, from which urine was freely discharged.

The second case was that of a woman, aged twenty-two years, whose trouble also developed suddenly and in the same manner as that of the first patient. Cystoscopic examination showed the presence of two large pyriform tumors, one at either side of the trigonum. They were sessile and smooth as to their surface. The right one was as large as a plum, the left one somewhat smaller. They underwent variations in size once or twice each minute. When they became dilated they would touch each other. Each one presented a slight depression on its surface, from which at intervals a jet of cloudy urine could be seen issuing.

A diagnosis of stenosis of both ureteral orifices with cystic dilatation of the vesical extremities of both ureters was at once made. In this case an endovesical operation was undertaken without an anesthetic. The bladder was lighted up with a Nitze's cystoscope, and an arrow bistoury, protected during its passage through the urethra by a metal cylinder, was then passed in, after which the tumors were punctured under direct guidance of the eye. They were thus incised upon five different occasions. There was very little bleeding at any time, and the tumor became progressively smaller after each treatment. At last the ureteral orifices became permeable and were catheterized without difficulty.

Commenting upon these cases, the author states that the affection is exceedingly rare. He was able to find only 13 cases reported in literature, and, of this number, only 3 were in adults. None of the latter were correctly diagnosticated, the true condition being revealed only at the time of operation. In such cases as the first one, in which the wall of the tumor has lost its power of contraction and becomes very much dilated, he thinks that prolapse into the urethra will not be uncommon. For these advanced cases he is of the opinion that a suprapubic operation is the procedure of choice. In other cases, however, he thinks that an endovesical operation will suffice. With the improvements in operative cystoscopes and their accessories, it may be possible to treat all of these cases by the endovesical method. Very few of us, however, will have occasion to do either the one or the other operation because of the rarity of the condition.

## THE BLADDER

**Intraperitoneal Rupture.** A. J. Galactionoff,<sup>1</sup> of St. Petersburg, has reported 15 cases of this accident which were treated in the hospital

<sup>1</sup> Roussky Vrach, November 12, 1910, tome ix, No. 46.

at Obouchoff during the last ten years. Of these cases, there were 5 which went on to recovery, 3 of the patients being operated upon during the first twenty-four hours, 1 at the end of thirty-six hours, and 1 at the end of eighty hours. In the first 4 cases, a diagnosis was correctly made and was confirmed by catheterization immediately after the bladder had been opened suprapubically. In the fifth case an erroneous diagnosis of volvulus was made, probably because the patient declared that he was able to urinate. In none of these cases was peritonitis present. In the tenth case, which terminated fatally, operation was practised at periods varying from twenty to ninety-six hours. In 5 cases in which catheterization was done one or two days before operation, peritonitis was present in 4. In the other 5 cases in which catheterization was done immediately before the operation, peritonitis was present in 3.

In the cases without infection, the symptom-complex may be divided into two stages. In the first stage, which lasts from twelve to twenty hours, signs of acute peritoneal irritation and vesical disturbances are noted. The latter consist in violent pain in the bladder and inability to urinate, despite the strongest desire and the greatest efforts. Occasionally a few drops of bloody urine, or even of pure blood, may be forced out. This sign, if associated with a suprapubic pain, is considered pathognomonic. The peritoneal symptoms consist in sharp pain over the suprapubic region and rigidity of the abdominal walls. Only rarely is vomiting present. The second period, which begins at the end of twenty-four hours or thereabouts, is characterized by an accumulation of fluid in the peritoneal cavity and the development of aseptic peritonitis, so called, which may result in intestinal symptoms suggestive of obstruction. The clinical picture may be much like that of volvulus, although distention of the abdomen is less.

If infection has occurred, then we have to do with septic peritonitis. If adhesive peritonitis occurs, the intestines may be so bound to the bladder that the rupture is closed or shut off from the peritoneal cavity to such an extent that a sac is formed in which the urine accumulates. The most common sources of infection are from the bladder itself and from the use of the catheter. In at least 4 cases the latter was responsible. Catheterization, however, is considered an indispensable diagnostic measure.

It is interesting to note that of these 15 cases, the rupture had taken place on the posterosuperior wall in 13. The mortality of this accident is high, it being 62 per cent. in 37 cases operated upon by the Russian surgeons.

**Sarcoma.** Munwes<sup>1</sup> has collected and analyzed 107 cases of vesical sarcoma from the literature, and finds that the disease is more common

<sup>1</sup> *Zeitschrift für Urologie*, November, 1910, tome iv, No. 11.

in men than in women, 70 per cent. of the former being affected in contradistinction to 30 per cent. of the latter. It is most common after the age of forty-five, and especially at about the age of fifty-five years. Its site of predilection is the trigonum and base of the bladder. In about one-quarter of the cases hydronephrosis resulted from occlusion of the ureter by the neoplasm. Invasion of the bladder and rectum is very common, and ulceration through the bladder into the peritoneal cavity sometimes occurs. Metastases have been found in the lungs, liver, suprarenal glands, and bony pelvis. The disease seems to originate in the submucosa, the mucosa remaining free for a long time.

Of 71 vesical sarcomata, 50 were sessile and 21 pedunculated. In one-third of the cases the tumor was of the round-cell variety; in one-sixth, of the spindle-cell kind. The others were of many different types, such as myxomatous, alveolar, etc.

It was found that in 86 of the 107 cases operation had been practised. Total cystectomy was done twice; partial cystectomy, eight times; partial cystectomy with resection of one or both ureters, five times; partial resection of the vesical wall, once; removal of the tumor without resection of the vesical wall, thirteen times; ablation by curettage, seven times, and removal with the finger, twice.

The author quotes the mortality rate of total cystectomy, which was 61 per cent. according to Goldenberg's statistics, based on 26 cases, and 56.6 per cent. according to Rafin's statistics, based on 30 cases. In the 2 cases in his series in which the operation was done, the patients promptly succumbed.

Concerning the ultimate result of operation for sarcoma of the bladder, it is discouraging to note that only 3 of the 69 patients upon whom radical operation had been done survived for any length of time. This paper is the most complete of any on the subject with which I am familiar.

**Myoma.** A relatively small number of cases of tumor of the smooth muscle of the bladder have been reported in literature. In all, they number 32 cases reported by almost as many authors. This series includes all forms arising from the smooth muscle, the typical and atypical benign form of myomata, and the sarcomata and endotheliomata of the smooth muscle.

From the very complete study of this series by Heitz-Boyer and Doré,<sup>1</sup> it appears that the sexes are about equally affected, and that there is a fairly equal distribution as to age.

In this series there occurred but 3 interstitial, 18 intravesical, and 11 peripheral tumors.

The beginning of the myomatous change occurred mostly in the middle layer of the bladder muscle, and the tumor location was variable. The size of the tumors varied from that of an apple to that of a child's

<sup>1</sup> Ann. d. Mal. gén.-urin., 1910, vol. D, Nos. 22, 23, and 24.



head, and the greatest weight recorded was 9 kg. The surface of the tumors may be smooth, lobulated, or nodular, and in about half the cases the neoplasms are encapsulated. The mucous membrane over the tumor is often thin and ulcerated. Occasionally malignant degeneration occurs.

The symptoms, depending on the location of the tumor, are hematuria, disturbance of bladder function, or abdominal constriction; and the chief diagnostic aids are bimanual palpation, the catheter, and the cystoscope.

The removal of the tumor is the only treatment to be considered. Small intravesical tumors can be removed through the cystoscope, those of the periphery in a manner similar to uterine myomata.

Of 23 patients operated upon, 7 died at periods varying from three days to six months after the operation.

Blum<sup>1</sup> reports the case of a young man, aged twenty-one years, who was seized with a severe attack of hematuria, which was soon followed by signs of cystitis and the development of a suprapubic tumor. Suprapubic cystotomy showed that the bladder was filled by a hard tumor the size of one's fist, attached to the base by a short pedicle. A piece of the growth was removed, and as it proved upon microscopic examination to be benign, the entire neoplasm was removed at a second operation. The author states that this is the twenty-fifth case of fibromyoma of the bladder to be found in literature and the eighth one in which operation was successfully done.

**The Fulguration Treatment of Papillomata.** The value of the fulguration method in removing papillomata of the bladder is brought out in an article by Buerger and Wolbarst,<sup>2</sup> who report 3 cases.

In one case of recurrent papillomata following a cystotomy, the galvano-cautery was used with no result. The fulguration method was then used, the current being directed against the tumor three times for fifteen seconds. The fragments of the tumor were discharged during the next few days, leaving an ulcer at the side of the tumor. The bladder became normal in three and one-half months.

In another case, one application of the current for five seconds was sufficient to remove the tumor.

In the third case, the current was applied to a large papilloma near the orifice of the left ureter. Periods of from ten to thirty seconds were employed four times in one week. At the end of the last treatment only a small necrotic mass remained, which in two weeks was but a small ulcer, and in a month there was left on the tumor site only a slight thickening of the mucous membrane, which was treated several times with the current to prevent recurrence.

<sup>1</sup> *Revue de Chir.*, 1910, p. 1231.

<sup>2</sup> *New York Medical Journal*, October 29, 1910.

**Tuberculosis.** At the meeting of the French Urological Association, 1910, Rovsing,<sup>1</sup> of Copenhagen, explained in detail his method of treating vesical tuberculosis with injections of carbolic acid and reported the results thus far obtained. As stated in previous communications, he generally uses from 25 to 50 c.c. of a freshly prepared 6 per cent. solution, injecting it through a catheter, allowing it to flow out after two or three minutes, and then repeating the injection until the fluid comes back clear. At first the treatments are given three times a week, and are thus continued until the urine remains clear on the intervening days; then they are given at longer intervals. Cystoscopic examination is made twice a month, so as to watch the progress of the case. In the majority of cases the mucosa rapidly assumes a normal color, and the ulcerations are replaced by smooth, white scars. The duration of this process of repair varies from four to six weeks. Twenty-eight patients were reported cured. In all of these cases nephrectomy had been done and a month allowed to pass before the treatment was begun, in order to determine whether the lesion in the bladder would begin to heal. The injections are sometimes extremely painful, but can be rendered tolerable by a preliminary injection of 25 c.c. of a 1 per cent. eucaïne solution and the use of a morphine suppository afterward. Patients show a variable susceptibility to pain. In some, a 3 per cent. solution is strong enough, and some tolerate only from 10 to 25 c.c.

At the meeting of the Russian Urological Association, 1910, Gramenitsky<sup>2</sup> read a paper on the use of colargol in urology. In the discussion several gentlemen corroborated the author's opinion as to its value in certain cases of vesical tuberculosis. One great advantage which it possesses is painlessness. A 1 per cent. solution has frequently been employed, being allowed to remain in the bladder a long time. Dr. Gorasch is of the opinion that it is of value only in superficial lesions.

**Malacoplasia.** Another case of this disease, which was first described by Hausemann in 1903, has been reported by Hedren,<sup>3</sup> of Stockholm.

Despite the 18 observations which have been made since, neither the etiology nor the pathogenesis of the affection has been learned.

The morbid process consists of an alteration in the vesical mucosa, which is studded with protuberances the size of a pea or a bean, or even larger, yellowish in color, as a rule, but with their summits often purple. Viewed under the microscope they are seen to be composed of large stratified cells having one or more nuclei. As to their origin, the weight of opinion seems to favor derivation from the connective tissue rather than from the mucosa.

Of the 21 recorded cases, only 3 were discovered during life. In these vesical symptoms were trifling. The condition was revealed, however,

<sup>1</sup> *Annales des Maladies des Organes Génito-urinaires*, 1911, vol. i, No. 2.

<sup>2</sup> *Ibid.*, vol. i.

<sup>3</sup> *Nordiskt Medicinskt Arkiv.*, 1911, xlv, No. 1; *Festkrift tillägnad Prof. J. Berg.*

by a cystoscopic examination. Usually there is an associated chronic disease, such as tuberculosis, carcinoma, or nephritis. Persons of middle or advanced years are generally affected, although one case occurred in a child of eleven years.

Hedren's case was that of a woman, aged forty-five years, who succumbed to a chronic nephritis, for which she had been under hospital treatment for upward of five months. Although she had shown no signs of vesical disturbance during that time, autopsy revealed an extensive malacoplasia of the bladder.

**Atony without Obstruction or Signs of Organic Nervous Disease.** Usually the primary cause of diminished function of the bladder is either some obstruction along the course of the urethra, such as benign or malignant enlargement of the prostate or a stricture, or an organic disease of the spinal cord, which results in impairment of the muscular function of the bladder. More rarely, however, cases of vesical atony occur in which there is no urethral obstruction nor any evidence of organic nervous disease. Thompson Walker<sup>1</sup> has reported 12 of these cases. In the majority of them the patients were young, ranging in age from twenty-two to forty years. A symptom common to all the cases was a gradually increasing disability in emptying the bladder, for which there was not any discoverable cause. The jet of urine was weak and intermittent, and there was always delay in starting the stream. Chronic overdistention of the bladder occurred in 4 cases. In 1 case involuntary escape of urine occurred upon muscular exertion and upon coughing. In another case enuresis developed. In 2 cases the quantity of urine was markedly diminished; in other cases it was increased.

Cystoscopy showed marked hypertrophy of the bladder. No evidence of any disease of the spinal cord was found in any of the cases, although in some the condition had existed for many years.

The *etiology* of this idiopathic atony of the bladder is not clear. The author concludes that it may possibly be due to a lesion in certain reflex centres in the hypogastric or hemorrhoidal plexus of the sympathetic which take part in the regulation of the bladder function. After the condition has existed for some time, complete spontaneous emptying of the bladder becomes impossible, and the patient has recourse to the catheter. This may lead to urinary infection, with its train of evil consequences. Such a complication occurred twice in the author's series. So far there has been little reported in literature on this subject.

Martin Ware,<sup>2</sup> of New York, also calls attention to a number of cases under his observation in which there was partial or complete retention of urine in old men without any demonstrable sign of urethral obstruction or disease of the central nervous system.

<sup>1</sup> Annals of Surgery, November, 1910.

<sup>2</sup> Ibid., January, 1911.



He believes this condition to be due to insufficiency of the bladder muscle caused by arteriosclerosis or some antecedent infection, by primary atrophy following a peripheral lesion of the nerves, or by atrophy succeeding hypertrophy.

The atony of the bladder may have its origin in the bloodvessels, the muscle, the nerves, or in an infection, and all these factors may be present in a given case. The nature of the case is determined by cystoscopy. Operation is contraindicated.

**Cystoscopic Findings in Early Tabes Dorsalis.** Irvin S. Koll<sup>1</sup> has had the opportunity of examining the bladder in several cases of early locomotor ataxia, and states that the cystoscopic picture is different from that which is seen in any other vesical condition. He states that the "most striking changes are found at the ureteral orifices, which, instead of showing rhythmical uniform, sphincter-like action with each extrusion, allow the urine to flow out without any evidence of muscular contraction." To this condition he applies the term *ureteral orifice rigidity*. The interureteral band was found to be more or less hypertrophied and the lateral walls and base of the bladder were trabeculated and looked as though they were continuous with the interureteric ligament at either end. This localization of the trabeculae distinguished the condition from that which occurs in the obstructed bladder. When these three conditions are observed, the author believes that a further examination for disease of the spinal cord should always be made.

**Glycerin Injections for Retention of Urine.** Otto Frank<sup>2</sup> reports favorably upon the use of glycerin injections in cases of retention of urine, stating that he found it extremely valuable in both sexes. It may be remembered that Baisch and Döderlein successfully employed an intravesical injection of a 2 per cent. boroglyceride solution, and that they found it to be especially efficacious in postoperative vesical paresis. Frank injects the solution directly through the urethra and obtains equally good results. This obviates the necessity of using the catheter. Although he does not state so, it is assumed that this method applies to the cases of females only, but it would be feasible to make the injection in males by means of hydrostatic pressure. He uses from 15 to 20 c.c., about 10 c.c. of which flow out of the bladder. The patients are said to urinate spontaneously within twenty minutes. He also considers it valuable in retention depending upon mechanical causes.

## THE PROSTATE

**Hypertrophy.** During the year but few important contributions to this subject have been made. The suprapubic operation continues to

<sup>1</sup> Chicago Medical Recorder, April 15, 1911.

<sup>2</sup> Zentralblatt für Chirurgie, January 14, 1911.

be the procedure of choice with the majority of surgeons. Freyer<sup>1</sup> has reported another series of 200 cases with only 9 deaths, which gave a mortality rate of 4.5 per cent. Five of these deaths resulted from uremia, 2 from exhaustion, 1 from bronchitis, and 1 from shock. Commenting upon these cases, the author states that the greater number of his patients applied for operation only when their condition under the use of the catheter had become so wretched as to render life intolerable.

Paul Steiner<sup>2</sup> has published the results of 43 operations which he has done by Freyer's method. All of his patients who recovered were entirely and permanently cured. His paper is interesting in that it illustrates how the outcome of the operation is so largely influenced by the patient's previous condition. Of 11 with complete retention but uninfected bladder, 10 were cured; of the same class with infected bladder, 6 out of 9 were cured. In 4 cases in which the patient had incomplete retention only, cure was obtained in all; in the same class without overdistention but with infected bladder, 15 patients were operated upon, of whom 10 were cured. In the stage of incomplete retention with overdistention, 3 out of 4 patients were cured.

In deciding upon operation, the author expresses the belief that it is of the utmost importance to be guided by the patient's general condition, and especially by the action of the kidneys. Although these desiderata seem very elementary, it is probable that the general mortality rate of suprapubic prostatectomy during the last ten years would have been considerably lowered had more attention been paid to them. The mortality rate from 1900 to 1905 will never be known, for the reason that small series of invariably fatal cases in which the operation was done without due consideration for exact indications and contra-indications have never been published. Fortunately more rationality prevails at present, so that a more careful investigation of patients' general condition is being made before operation and better postoperative treatment is being employed. Particularly interesting in this respect is a contribution by Paul Kayser,<sup>3</sup> who has reported a series of cases from Kümmell's clinic. Except for special symptoms, such as severe hemorrhage, unusual difficulties of catheterization, associated symptoms of vesical calculi, etc., the radical operation is not deemed necessary until chronic retention occurs. The social condition of the patient is also considered an important circumstance in deciding upon operation. Among the usual contraindications to operation, the author mentions pronounced arteriosclerosis, advancing senile dementia, irreparable insufficiency of the vesical musculature, and, above all, advanced disease of the kidneys. The surest sign of the last-named condition is considered to be a reduction of the freezing point of the blood to 0.60°

<sup>1</sup> Lancet, April 8, 1911.

<sup>2</sup> Zeitschrift für Urologie, 1911, Band v, Heft 8.

<sup>3</sup> Beiträge zur klin. Chir., 1911, Band ii, Heft 2.

or below. Contrary to the former custom, the attention to the wound itself after operation, and especially the after-treatment, is now deemed of the highest importance.

Bladder sutures are relied on primarily and in all cases, because they insure against hemorrhage and inflammation. When it has been necessary to lengthen the incision along the anterior wall of the bladder in order to get the prostate out, the lower part of the incision is closed with interrupted sutures; otherwise the bladder wall is attached directly to the abdominal wall with interrupted sutures, especial care being taken at the lower angle of the incision to prevent a leakage of infected urine into the fatty tissue behind the deep fascia, lest such an action result in tissue destruction. This method isolates the whole space of Retzius from the bladder wound.

The space left by the enucleation of the prostate is packed with gauze, which is then carried out through the suprapubic opening as a drain surrounded by rubber tissue. The abdominal muscle and skin are then closed to the entrance of the drain by interrupted sutures of silk.

The stiff catheter (Nos. 22 to 25) used for distending the bladder with boric solution is left in place for continuous catheterization. Kayser lays the greatest stress upon the patient's general condition, and maintains that bronchitis and bronchopneumonia are far more dangerous than the most unpleasant complication arising from the wound area.

The patients are placed in a semirecumbent position from the first, and on the day following operation are placed in a sitting position out of bed for an hour or two. This method of treatment combined with breathing exercises is one of the best factors in preventing all complications which might retard convalescence. Stimulation with digitalis and camphor, and wet packs, together with friction, are employed at the first sign of bronchitis.

During the last two years the local after-treatment has been greatly facilitated by an elliptical celluloid urinal devised by Hamilton Irving. The urine flowing from the wound is caught in this receptacle, which also has a lid and two tubes through which the urine is carried off. The apparatus is held in place on the abdomen by a band and two thigh-straps. The skin beneath the urinal is treated with a paste to make the edge of the former adhere closely to it. This apparatus does away with the irritation from urine-soaked pads, layers of dressing are superfluous, and there is no skin irritation from adhesive plaster; moreover, it keeps the gaping edges of the wound approximated and allows flushing without wetting the dressings when clots lodge in the bladder or catheter.

The only unpleasant feature of this method is the pressure on the skin from the bands, and this is overcome by padding. The gauze drain becomes soaked with urine within twenty-four to thirty-six hours,



and is then entirely removed, together with the tampon in the bladder. If fresh blood appears during the withdrawal of the latter, its complete removal is postponed for two days. The urinal is then placed over the wound and further healing is uninterrupted. If the catheter works well it is left in place from ten to twelve days.

E. S. Judd,<sup>1</sup> who has reported a series of 542 prostatectomies from the Mayos' clinic, lays stress upon the importance of proper preparatory treatment, stating that it has not only lowered their mortality rate during the last few years, but that it has resulted in easier convalescence and more satisfactory ultimate results.

Preliminary drainage of the bladder, either by continuous catheterization or through a suprapubic vesical fistula, has relieved symptoms of obstruction and thereby brought about improvement in general health, so that the radical operation could be done secondarily under much more favorable circumstances than it could have been done at first.

Cystoscopy is almost routinely employed, and is considered a very valuable diagnostic measure. Median perineal prostatectomy is the usual procedure, but if cystoscopy reveals a calculus of any size, if the gland bulges into the bladder, or if its upper border cannot be reached by the examining finger through the rectum, the suprapubic operation is resorted to. The author states that the mortality is not affected by the type of operation. This circumstance certainly reflects credit upon the judgment of those who determine which method shall be employed in a given case. Three hundred and twenty-three perineal operations, and 141 suprapubic operations were done for benign hypertrophy.

Ninety per cent. of the patients have been traced, and nearly all of them have been found to be absolutely relieved from suffering. None of the patients operated upon by the suprapubic method had subsequent incontinence.

Seven operated upon by the perineal route had a certain degree of incontinence, but some of them had suffered in this respect before operation. Some did not have good control of the bladder shortly after the operation, but regained it later. It was found that 10 patients occasionally have to use a catheter, owing for the most part to atony of the vesical musculature.

In 14 badly infected cases, the vas deferens was ligated and divided just before the prostatectomy was begun. In these cases, there was no development of inflammation in the epididymis or testicle.

Cholzoff,<sup>2</sup> who employs the suprapubic operation exclusively, also sometimes does it in two stages, first performing a cystostomy under local anesthesia in order to secure drainage of the bladder and bring about improvement in the patient's general condition, and then later enucleating the prostate at a second operation. The interval between

<sup>1</sup> Journal American Medical Association, August 5, 1911.

<sup>2</sup> St. Petersburg Mediz. Wochenschrift, 1910, No. 45.

the two procedures varies from three weeks to three months. The author believes that this method not only makes it possible to operate upon patients who could not at first be subjected to a radical operation, but that it also materially lowers the mortality rate.

Pasquereau<sup>1</sup> reports the removal of a prostate which weighed 460 grams. He believes it to be the largest one on record, although several weighing more than 250 grams have been reported. Freyer mentions one which weighed 308 grams.

**Carcinoma.** Young<sup>2</sup> reports 111 cases, from which he draws the following conclusions:

The disease is more frequent than generally supposed, being found in 20 per cent. of all cases in which the prostate is enlarged. Thus, in 500 cases of urinary obstruction, 400 were due to simple hypertrophy and 100 to cancer. The symptoms in general are the same as those of simple hypertrophy, but the pain, which may be either localized or radiating, and which often resembles that of other affections, such as renal, spinal, sciatic, for instance, is very often the principal symptom.

The malignant focus may begin as a small nodule in a healthy prostate, or in one chronically inflamed. A simple hypertrophy may undergo carcinomatous change, but generally in a part of the gland not hypertrophied. The malignant disease most often occurs in the posterior subcapsular region behind the lateral hypertrophied lobes, and it long remains localized within the substance of the lobes, the urethra, bladder, and posterior capsule resisting invasion for a long time.

Periprostatic involvement generally begins along the ejaculatory duct in the space just below the prostate between the vesicles and the bladder above the aponeurosis of Denonvilliers. From there it gradually extends to the interior surface of the trigonum and the lymphatics on the walls of the pelvis. Encroachment upon the latter region occurs very late, even after metastases to the bones occur.

The belief is expressed that when the prostate of a man more than forty-five years of age is found to be enlarged or to contain an indurated nodule, the possibility of cancer should be thought of, and this is considered to be especially true if there is no chronic prostatitis, and if no hypertrophied lobe projects into the bladder. In such cases, even if there be but few symptoms, it is believed wise to do an exploratory operation, and if a view of the posterior surface of the prostate is not sufficient to enable a diagnosis to be made, a frozen section should be prepared and examined at once by a competent microscopist. If malignant changes are found, then, of course, a very radical operation should be done, as cure can be obtained only by methodical excision of seminal vesicles, vasa deferentia, and the anterior two-thirds of the trigonum.

<sup>1</sup> *Annales des Maladies des Organes Génito-urinaires*, January 2, 1911.

<sup>2</sup> *Ibid.*, 1910, vol. ii, Nos. 19 and 20.

Such an operation does not prevent great technical difficulties, nor is it very dangerous. Furthermore, a cure has been obtained, in one case five years having elapsed since operation. When the disease is far advanced and micturition is difficult, catheterization must be resorted to. If it prove very difficult or painful, then a palliative operation, either suprapubic cystostomy or conservative perineal prostatectomy, is recommended.

Kayser<sup>1</sup> has reported the cases of prostatectomy which were done in Kummell's clinic between the years 1902 to 1910—101 in all—of which 12 were for cancer. Of this number, 7 patients succumbed shortly after the operation. Of the remaining 5, 3 died, either from local recurrence or general metastases at the end of six, nine, and twelve months respectively. Two, however, were reported in good health at the time the paper was written—one at the end of three and one-half years, and the other at the end of five years. It is to be regretted that the exact method in which the operation in these cases was done is not described.

Although the percentage of recovery following operation for malignant disease in the prostate is low, even the occasional report of cases so successful as these mentioned by Young and Kayser offer encouragement. In malignant disease of the prostate, the same as in that of other organs, better results can be expected only from early diagnosis. It would seem that any further technical improvements are not so much to be desired as is the acquirement of such additional knowledge as will make it possible for the cases to be diagnosticated at a time when early and radical treatment may possibly result in cure.

Cathelin,<sup>2</sup> whose views on treatment of carcinoma of the bladder and prostate are well known to genito-urinary surgeons, states that diagnosis must depend entirely upon rectal palpation, and that the stage at which it can be made will rest entirely upon the examiner's delicacy of touch. He thinks that prostatectomy in such cases is useless, and that the more extensive operations in which total removal of all carcinomatous tissue is attempted, together with division of the urethra and resection of the bladder below the ureters, followed by partial cystorrhaphy and ureteral implantation, are not justifiable. Certainly he waxes facetious when he states that our efforts in these cases should be directed toward the discovery of a curative serum related to "606," a single injection of which would cause the tumor to melt away like snow before the sun.

Whiteside,<sup>3</sup> writing upon the same subject, believes that the only indications for operating are pain, retention of urine, or severe and weakening hemorrhage. He also is of the opinion that as much good can be done by simple perineal prostatectomy in the average run of

<sup>1</sup> Beiträge zur klin Chirurgie, Band lxxi, Heft 2.

<sup>2</sup> Folia Urologica, December, 1910.

<sup>3</sup> Northwest Medicine, December, 1910.



cases which the surgeon sees, as by the more extensive operations. Certainly he must consider surgical treatment merely as palliative.

With reference to diagnosis, he attributes great importance to dull, aching pain. That the diagnosis is most difficult in the early stages, and may not be made until the pathologist gives his report on examination of the specimen shown at operation, he readily admits.

E. S. Judd,<sup>1</sup> reporting the cases from Mayos' clinic, advises operation only when obstruction and bladder symptoms are present. Pains radiating through the pelvis and back are considered symptoms of a disease so advanced that operation will prove of little benefit.

Seventy-four patients were operated upon, partial prostatectomy being the procedure usually employed. In 65 cases, the diagnosis of malignancy was made prior to operation; in 9, the true nature of the disease was determined by microscopic examination of the gland after its removal. The author states that the immediate results of operation in these malignant cases were quite as good as those obtained in benign cases. With reference to ultimate results, 1 patient is alive and well four and one-half years after operation; 1, more than three years; 4, two years; and 2, more than one year.

The relative incidence of carcinoma and hypertrophy was approximately 1 in 6.

It seems that Young's idea of having a piece of tissue removed from the gland in every doubtful and suspicious case and immediately subjected to careful microscopic examination by a competent pathologist constitutes a decided advance in our diagnostic measures. This method has proved so trustworthy in other forms of suspected malignant disease, notably in disease of the breast and cervix uteri, that much good may be expected to result from its application to prostatic cases. Our knowledge of the more frequent incidence of malignant disease of the prostate should make us doubly careful not to allow any suspicious case to pass undetected. Some good pathologists are inclined to place only slight reliance in the results obtained from the examination of frozen sections made during the time of operation; and while it must be admitted that the results obtained from this method cannot compare for certainty with those secured by the examination of many sections of tissue prepared in the usual manner, they have proved so satisfactory in many cases of which I have personal knowledge, that I have come to consider the method an essential one in the class of suspicious cases just referred to. If the results prove equally gratifying in prostatic carcinoma, we shall certainly be in a position to make more accurate diagnoses than we have heretofore been able to make.

<sup>1</sup> *Journal American Medical Association*, August 5, 1911.

## THE PENIS AND URETHRA

**Tuberculosis.** Carl Rose,<sup>1</sup> of Strassburg, has made a thorough study of tuberculosis of the penis. With the exception of those cases caused by ritual circumcision the affection is very rare, there having been but 8 cases, including the author's, thus far reported in the literature. It is most frequently found associated with tuberculosis of the kidneys, bladder, or epididymis. Its etiology is obscure. The author correctly remarks that it is hard to understand the infrequency with which the external genital apparatus of the male is affected by tuberculosis, when the internal urogenital organs are so frequently attacked. It is still a question whether inoculation takes place only at those points where epithelium has been lost, as after a gonorrheal infection. The origin of such cases as occur in persons having no other demonstrable lesions of tuberculosis is in greatest doubt. In such cases it must be assumed that the infection is carried from some hidden focus in the body through the blood or lymph channels. A last possibility is the contraction of the disease during coitus from a tuberculous lesion in the female genital organs. Up to the present time there has been no report in literature of a case contracted in this manner. Every part of the penis is liable to the infection.

The *diagnosis* usually offers no difficulty, yet occasionally a case may be very puzzling. It is easy where tuberculosis is demonstrable in other genito-urinary organs. If a urethral discharge is the only symptom, however, it is difficult, as only a gonorrheal infection is then suspected; and it is not until typical ulcerations develop that the true nature of the disease is revealed. Where gonococci are found in the discharge at the beginning, the two conditions are associated, but there would be nothing present at that time to suggest tuberculosis, and later developments only would arouse the suspicion of the double infection. The tubercle bacillus, both at the onset and during the later stages of the disease, is found only with difficulty, and solely in the purulent discharge. For this reason experiments with animals will not always be helpful in early cases. Tuberculosis of the penis, in a man otherwise healthy and free from tuberculosis elsewhere, may have to be differentiated from hard chancre, chancroid, and carcinoma. In this connection the following points are of value. In chancroid auto-inoculation would prove positive. In hard chancre the presence of the spirochetes and a positive Wassermann reaction would be valuable testimony, while the absence of the signs would preclude its being a hard chancre. In syphilis a further development of the disease would lend a characteristic appearance to the lesion, the ulcers, as a rule, having a hard edge and a closely

<sup>1</sup> Beiträge zur klin. Chirurgie, 1911, Band ii, Heft 1.

adherent, lardaceous covering at the edges and base, besides a moderately inflamed appearance beyond the circumference. In tuberculosis, the ulcerations usually have bluish, undermined edges, and a yellowish base covered with caseous material. Carcinoma usually possesses hard, wall-like edges, but in doubtful cases a small portion should be excised for pathological examination.

The *prognosis* of tuberculosis of the penis depends upon whether the case is one of isolated tuberculosis or whether it is associated with pulmonary tuberculosis or a similar infection of other genito-urinary organs. In the latter case, the prognosis is that of the associated condition. In the isolated cases, the prognosis is grave only in children who have been ritually circumcised, almost all of whom die within the course of a year. In other isolated cases a slow recovery may follow operative procedures. The progress of this condition is slow, it having existed in one case for six years. The tendency toward the development of generalized tuberculosis from these lesions is very slight.

The *treatment* in each case should be governed by the general condition of the patient and the character and extent of the ulceration. When the tuberculous involvement of the urethral mucous membrane is small, injections of iodoform in glycerin or a corrosive sublimate solution are sufficient. When larger areas are involved, it becomes necessary to remove the granulations with a sharp curette. Occasionally, as when only the prepuce or the skin externally is affected by the morbid process, it is necessary to excise the area. Amputation of the penis becomes necessary when the glans or larger portions of the organ are affected, and if the process extends to other parts of the genitalia, such as the testicles or epididymis, these should be removed at the same time. When the involvement in a urogenital tuberculosis is too widespread, or when a high degree of pulmonary tuberculosis co-exists, no elaborate surgical procedure should be attempted. Under such circumstances palliative treatment should be employed.

**Operations for Diffuse Cancer of the Penis.** Chozzoff,<sup>1</sup> of St. Petersburg, discusses the advisability of total emasculation in cases limited to the anterior portion of the organ, and which has even been practised by some surgeons in epitheliomata of the glans. According to Kuettner, the disease is propagated locally by the vessels of the corpora cavernosa, whereas metastatic dissemination takes place through the lymphatics. As the bloodvessels and lymphatics of the testicle are independent of those of its coverings and also of those of the penis, it follows anatomically that a total emasculation is not indicated when the disease is limited to the penis. The author remarks that statistics do not show the more extensive operation to be any more radical than a simple amputation. Indeed, the statistics of Kuettner favor the latter

<sup>1</sup> Zeitschrift für Urologie, September, 1910.



operation, as they show 60 per cent. of cures. Furthermore, Berni reports 9 cures out of 11 cases, although he does not state the period of time which had elapsed since operation. If, as Cholzoff states, nearly all recurrences take place in the inguinal and pelvic lymph nodes, and not in the scar, then his contention, and that of Kuettner as well, seem feasible; certainly, if the best results are to be obtained, the inguinal glands should be removed at the time of the primary operation, even though they are not palpably diseased. Cholzoff's operation consists in making a urethrostomy, either in the perineum or anterior to it, according to the extent of the neoplasm; removal of the inguinal lymph nodes on both sides; amputation of the penis and removal of the corpora cavernosa at the crura. The inguinal wounds are sutured and the perineal wound is packed with gauze. Of the 4 patients upon whom he operated, two died of recurrence at the end of seven and nine months respectively. At the end of two years, however, one patient was entirely well.

**Retention of Urine due to Phimosis.** George H. Edington,<sup>1</sup> of Glasgow, reports two interesting cases of retention of urine due to phimosis. One was a case of complete retention in a man, aged eighty-four years, who suffered from congenital phimosis and had occasionally suffered from retention during attacks of balanitis. Upon the occasion in question the physician in attendance found it impossible to pass a small rubber catheter into the meatus, and Edington, who was summoned in consultation, was unable to insert the point of a small scissors through the preputial orifice, so tight and so swollen was the foreskin. Under an injection of novocain and suprarenin it became possible to expose the glans with a scissors, whereupon the patient was at once relieved.

The second case was that of a boy, aged twelve years, the subject of a bad phimosis, who had been affected with pyuria and fever for four days prior to admission to the hospital. Upon examination it was found that there were signs of extravasation of urine, and so the perineum was incised and drained, but without opening the urethra, however. Circumcision was performed at the same time. In this case the retention was not complete, but there had been sufficient obstruction to affect the urethra in the same way as a tight stricture affects it. In both of these cases there was some atresia of the meatus, but not enough to cause the trouble which the patients experienced.

The author considers these cases unusual, and in this opinion I fully agree with him. Disturbances of micturition due to phimosis are by no means uncommon, but complete retention must be exceedingly rare.

Edington also calls attention to an interesting postoperative sequel of circumcision. It consists of a superficial ulceration of the meatus which may be followed by stenosis when healing takes place. He believes that

<sup>1</sup> Hospital, London, December 31, 1910.

it is caused by irritation from the child's clothing, and also probably by uncleanness, or at least carelessness in caring for the wound, inasmuch as he has hardly ever seen it in children of the well-to-do. He states that the children are usually brought back to the hospital two or three weeks after the operation because of trouble in urinating, and that examination reveals the condition above referred to. I do not remember having seen this condition, although edema and slight soreness of the lips of the meatus are by no means uncommon after circumcision, both in children and adults. I have observed it in adults in the better walks of life quite as frequently as in dispensary and hospital patients. Some of the children formerly treated in dispensary practice developed considerable irritation and soreness for want of proper care after the operation, but as I have above stated, I do not recall a single case in which ulceration occurred.

Concerning the *treatment* of this condition, Edington lays great stress upon prophylaxis, advising that the parts be bathed with boric acid solution, and that a little vaseline or boric acid ointment be applied to the meatus. The same line of treatment is to be followed in well-developed cases. In some old cases he found it necessary to perform meatotomy. These cases likewise occurred irrespective of any congenital atresia of the meatus.

Karl Suhl,<sup>1</sup> of Giessen, has recently advised gradual stretching of the prepuce for phimosis in boys under ten years. He remarks that the method is often employed by general practitioners. Writing upon the subject about two years ago, I took occasion to condemn this method, and further observation of some of the results obtained by it has not led me to change my opinion. Although not denying that there are cases in which good results have followed its practice, I have seen so many in which the parts have been bruised and lacerated, so that thick adhesions formed between the prepuce and glans, and thus rendered the condition of the child worse instead of better, that I believe the method should be entirely abandoned in favor of circumcision, which, when properly done, gives results which are permanently satisfactory. Suhl admits that the condition of phimosis may arise again after stretching has been done, and in such cases advises circumcision.

**Priapism.** Dujon<sup>2</sup> reports the case of a young man convalescing from diphtheria who suddenly became aware of painful erection, which came on without cause and failed to subside. Upon examination, it was found that the corpora cavernosa only were affected, the corpus spongiosum not being at all involved. Aside from the pain and discomfort which the patient experienced, he was unable to urinate, and had to be catheterized. He was operated upon a few days after the

<sup>1</sup> Deutsche medicinische Wochenschrift, 1910, No. 48.

<sup>2</sup> Arch. Prov. de Chir., November, 1910.

onset of the trouble according to a method which the author considers original with himself. Instead of incising the corpora cavernosa vertically along the penis, according to Terrier's method, a perineal incision was made and the left corpus cavernosum was opened at its root by cutting through the ischio-cavernosus muscle. Both bodies then emptied themselves of thick black blood, which upon examination was found to be free from bacteria. Immediate cessation of pain and reestablishment of micturition followed the operation, and the case rapidly progressed to recovery. At the time that the case was reported, however, erections had not taken place. The author believes that this operation is indicated both for the purpose of relieving pain and obviating the necessity of catheterization. He is of the opinion that it favors the return of erectile function because it early relieves distention of the corpora cavernosa. A perineal operation is thought to afford better drainage also, and as the corpora cavernosa communicate in the perineal space, it is necessary to incise only one.

**Plastic Urethral Operations.** At the meeting of the Surgical Society of Lyons, on January 26, 1911, Le Riche and Cotte<sup>1</sup> showed a patient upon whom they operated for congenital stenosis of the external meatus according to the method which Nové-Josserand employs for the cure of hypospadias. The patient was a man, aged twenty-eight years, who in 1908 had had a circumcision and meatotomy performed. Dilatation subsequent to the operation resulted in the temporary establishment of the normal caliber of the anterior urethra, but as the patient neglected to have the sounds passed regularly, contraction of the meatus recurred, so that at the time he came under observation he presented certain signs of retention of urine. The authors conceived the idea of replacing the balanic portion of the urethra with a fragment of skin according to the method of Nové-Josserand, and accordingly, after explaining to the patient the difficulties of securing any successful operative results, first made a temporary perineal fistula and then resected the balanic portion of the urethra in its entirety, after which they replaced it with a piece of skin.

This they introduced wound around a soft rubber catheter. The catheter was removed on the eighth day and dilatation begun on the tenth. Three weeks later the new urethra permitted the passage of a No. 28 French instrument. Urethroscopy showed that the internal lining was completely healed. The perineal fistula was almost closed at this time. Whether the ultimate result will be as good as the immediate one evidently time alone can tell. Nové-Josserand, however, states that artificial urethræ thus constructed have remained permeable, and, moreover, that they may become larger than they are at first. The principle of such procedures impresses me as being a good one, especially in cases in which considerable destruction of the urethra has taken

<sup>1</sup> Lyon Chir., April 1, 1911.



place. Whether such urethræ can be better constructed by using skin, mucous membrane, or segments of veins remains to be determined.

In connection with the latter, it is interesting to note that Tanton<sup>1</sup> has concluded that contraction of the new channel (vein) may take place.

In one case he used vaginal mucous membrane to form a new urethra. The patient upon whom the procedure was tried was a man, aged thirty-four years, suffering from multiple urethral strictures and a perineal fistula, through which the entire quantity of urine was discharged.

The penile urethra was dissected out and a fragment of vaginal mucosa from a patient upon whom a colpoperineorrhaphy had just been done was substituted in the usual manner. The catheter upon which it was introduced was left *in situ* three days. The graft took very nicely despite the formation of a tiny fistula along the posterior line of suture. This, however, closed spontaneously after a few days. At the end of a month a 53 Beniqué passed easily, and the patient urinated without difficulty.

**New Methods of Diagnosis and Treatment of Lesions of the Posterior Urethra.** Buerger<sup>2</sup> again describes fully his cysto-urethroscope and appends complete directions for its use. The various lesions of the urethra revealed by it are enumerated, symptoms described, and treatment outlined.

Cysts of the urethra were encountered in 25 of 300 cases. They are either of the chronic inflammatory type (urethritis chronica cystica) secondary to attacks of gonorrhea, or are of the retention type. The latter belong to the period of senile involution. The inflammatory cysts are most frequently found in the pars supramontana, although they are often seen in the montane portion, and may even involve the colliculus itself. The verumontanum was found markedly diseased in two cases. Confluent cysts are sometimes seen, although the most common variety is the simple discrete. The surface of these cysts seems to be made up of a pearly veil-like membrane in which very fine arborescent vessels ramify. The surrounding mucous membrane is usually thickened and sessile, and cysts of the supramontane portion are larger, oval, more velvety. The more apt to be solitary. Sometimes small cysts are seen in the fossula prostatica, where tiny bodies are found in depressions in the posterior frenula, and may even ride upon the frenula themselves.

The type of the pathological change above described may at times become very extensive.

The symptoms associated with these cysts vary. There may be no symptoms at all, or there may, in a collection of cases, be such symptoms as increased frequency of micturition, impotence, neuralgic pain in

<sup>1</sup> Bull. et Mém. Soc. de Chir., Paris, December 20, 1910, xxxvi, No. 37.

<sup>2</sup> New York Medical Journal, December 3, 1910; Folia Urologica, December, 1910; American Journal of Dermatology and Génito-urinary Diseases, January, 1911.

the perineum, etc. They are not thought to be invariably dependent upon the cysts themselves.

The *treatment* consists either in incision with a small knife which, with its sheath, may be attached to the cysto-urethroscope, or in fulguration. In the latter case the spark from the Oudin current, generated either by an x-ray machine or a special high frequency machine, is employed. It is directed against the lesion by means of an isolated copper electrode through the cysto-urethroscope. Detailed directions for its use are given. The same work can be accomplished with an ordinary electrocautery.

In addition to cysts, the posterior urethra may show a hypertrophic condition of the mucous membrane, presenting through the cysto-urethroscope an appearance as of knob-like excrescences. Treatment is by fulguration or with the galvanocautery.

Small papillomata in the region of the verumontanum are not uncommon. They may be either sessile or pedunculated. Treatment by the Oudin current or with a special cautery apparatus should be instituted.

The author has invented a "close vision" cystoscope, by which distortion of the field in operative work in the region of the sphincter is avoided.

The treatment of strictures by the Oudin current and of chronic prostatitis by diathermy with the D'Arsonville current is suggested.

**Treatment of Chronic Urethritis by Aspiration.** Bronner<sup>1</sup> describes an apparatus for this purpose, consisting of a straight metallic sound, which is hollow and perforated with minute holes as to the greater part of its surface. The upper end terminates in two branches, to which two rubber bulbs, supplied with metal stopcocks, are attached. One of these bulbs is used for aspirating, the other for irrigating. After having flushed out both anterior and posterior urethra, the bladder is filled with fluid and the instrument, well oiled, is introduced. The glans is covered with a thin layer of cotton, which is fastened by thread sufficiently taut to prevent the entrance of any air during the process of aspiration. One of the bulbs is then filled with the irrigating solution, and the air is forced out of the other one by compressing it, after which the stopcock is closed. Both are now attached to the instrument. While holding the glans firmly with the left hand, the stopcock of the aspirating bulb is opened. The process of aspiration thus begun is continued from ten to fifteen minutes, and the urethra is then irrigated. The results observed are as follows:

The treatment is painless and has never produced the slightest bleeding. Leukocytes, and also very often true purulent filaments, as well as epithelium, are found in the irrigating fluid which returns.

<sup>1</sup> Annales des Maladies des Organes Génito-urinaires, 1911, vol. i, No. 2.

In cases of keratinization of the mucosa, the quantity of epithelium brought out by aspiration is sometimes enormous. Patients who had been subjected to different methods of treatment without result improved markedly. The author believes that this method possesses a multiple therapeutic action, namely, the exfoliation of the urethral mucosa in cases of keratinization and an aspiration of glandular secretion, and also that by producing hyperemia it exerts an influence on localized inflammatory areas similar to that which is produced by Bier's treatment.

**Congestion of the Verumontanum.** Lawrence T. Price<sup>1</sup> reports the result of his observations concerning congestion and inflammation of the verumontanum. He has found that such a condition is not uncommonly responsible for a whole train of genito-urinary symptoms, which, taken together, constitute the symptom-complex presented by many patients usually classed as sexual neurasthenics. Chief among these symptoms may be mentioned frequent and painful urination, ill-defined pains in the back, groin, and thigh, and disturbances of sexual power. The condition may be due either to urethral inflammation or to the congestion following masturbation. When viewed through the urethroscope, the verumontanum is seen to be enlarged and very vascular, and it is extremely sensitive.

*Treatment* consists either in applying a strong silver solution, 15 per cent., to the surface of the verumontanum itself, or of injecting the sinus pocularis with a few drops of 10 per cent. silver solution. The painful reaction produced by this treatment is said to subside after two or three days, and, as a rule, a second treatment is not required. No further treatment is employed except to pass a large sound two or three times to prevent any narrowing of the urethra. The author states that many of the patients thus affected had been treated for prostatitis, but without any relief.

## THE TESTICLE, EPIDIDYMIS, AND CORD

**Similarity between the Signs of Hematocele and Early Malignant Disease of the Testicle.** That scrotal tumors are difficult of exact differential diagnosis is a fact well-known to all surgeons who have had much experience with them. It is an unfortunate truth that syphilitic testicles are still occasionally removed with the belief that they are sarcomatous. In a recent contribution to the subject, Woolfenden,<sup>2</sup> of Liverpool, cites several cases which illustrate the difficulty of differentiating between hematocele and early malignant disease of the

<sup>1</sup> The Virginia Medical Semimonthly, February 10, 1911.

<sup>2</sup> Liverpool Medico-Chirurgical Journal, January, 1911.



testicle. On account of the close resemblance between the physical signs of these two conditions, the diagnosis often must be made solely upon the history of the case, and this is often so incomplete and unsatisfactory that little reliance can be placed upon it, especially in the case of dispensary and hospital patients.

Usually a history of accident can be elicited in both conditions, it being either the cause of the hematocele or the determining factor in producing rapid increase in growth of a previously slowly developing neoplasm. In cases of the latter kind the patient may only become aware of enlargement of the testicle after the injury has been sustained. After narrating three cases, in two of which erroneous diagnoses had been made, Woelfenden enumerates the signs which were common to all of them. They consisted in the presence of a non-translucent large tumor, in which the details of the testicle had become obliterated and which gave an indefinite sense of fluctuation. The spermatic cord was only slightly thickened or normal, and one of the cases of hematocele showed this sign quite as well as the case of malignant disease.

The author very pertinently remarks that in the latter stages of malignant disease the markedly infiltrated cord and enlarged lymph nodes make the diagnosis easy, but also show the futility of subjecting the patient to surgical intervention. It is evident that all suspicious tumefactions which do not yield to antisyphilitic treatment should be subjected to the scalpel.

**Epididymitis.** Under the somewhat startling title, "Abortive Treatment of Gonorrheal Epididymitis," Asch<sup>1</sup> gives the results obtained by injecting the diseased epididymis with *electrargol*, a colloidal silver preparation, prepared by Clin, of Paris. If the injection be made sufficiently early, when the epididymis is no bigger than the little finger and is just beginning to be sensitive to pressure, he states that the inflammatory process is arrested, so that there are neither subjective nor objective signs of inflammation at the end of two or three days. Eighteen early cases were so treated, and the results were the same in all. No infiltrate remained. In later cases, when the epididymis is much larger, the surrounding tissue edematous, the skin tense, improvement is said to follow the first injection, although a second, third, and in some cases even a greater number of injections are given at intervals of twenty-four hours. After three days the patients are usually able to be about. Fifteen well-developed cases were treated in this manner. In the majority of these cases, too, no infiltrate remained. The author concludes that this method constitutes a true abortive treatment if used sufficiently early.

Doré and Desvignes<sup>2</sup> also report favorably upon this method of treatment, which they have used in 6 cases. They state that its tech-

<sup>1</sup> Zeitschrift für Urologie, February, 1911, Band v, Heft 2.

<sup>2</sup> Annales des Maladies des Organes Génito-urinaires, 1911, vol. i, No. 11.

nique is simple, that patients do not object to it, as they are so apt to do when incision is mentioned, and that the pain which attends it is slight. The results are quick, relief being experienced almost immediately, and recovery taking place within a few days. They believe it to be the most satisfactory treatment yet devised. In 4 other cases a preparation known as *electraulol* was used with equally good results.

On the other hand, G. G. Smith<sup>1</sup> advocates *puncture of the epididymis* in all severe cases of gonorrheal inflammation, stating that the relief of pain is almost immediate, and that the infiltration subsides more rapidly than when any other treatment is employed. He always uses local anesthesia. The incision in the tunica vaginalis is closed with catgut, a cigarette drain is introduced, and the integument is then sutured.

At the last meeting of the Italian Society of Dermatology and Syphilography, Ciuffo,<sup>2</sup> of Pavia, reported the results which he obtained with various *antigonococcic sera*. The majority of the patients to whom he gave serum were affected with epididymitis, and contrary to the experience of many who have used serotherapy in these cases, Ciuffo states that the results were invariably satisfactory. His method of administering the remedy differs somewhat from any with which I am familiar, as he uses it in unusually large doses. On the first day of treatment he injects 10 c.c., and continues to give this quantity each day. If improvement is evident after the second or third injection, treatment is discontinued, but if somewhat slow, it is continued for four or five days and occasionally for six. It is not considered advisable to give more than six doses of 10 c.c. each on successive days. The average number given were four, which proved sufficient to bring about a cure. If a pronounced erythema develops, the injections are stopped. Fortunately, his sign usually manifests itself when the height of the improvement is reached. It will be interesting to observe the results of these large doses of antigonococcic serum as recommended by Ciuffo in order to determine whether the gratifying results he has obtained are due to the more heroic doses which he has employed.

In a number of cases of gonorrheal epididymitis I have used Parke, Davis & Co.'s serum in the dose of 4 c.c. until a systemic reaction was obtained, and think they pursued a milder course and underwent resolution more quickly than those in which serotherapy was not employed. Perhaps if it be given more freely the results will be more striking.

John C. Spencer<sup>3</sup> reports favorably upon the use of *vaccines in epididymitis*, stating that they lessen the severity of the symptoms and shorten the course of the disease. The initial dose is 50,000,000 devitalized gonococci. Doses as high as 500,000,000, however, may be given.

<sup>1</sup> Boston Medical and Surgical Journal, February 2, 1911.

<sup>2</sup> Giornale Italiano delle Malattie Veneree e della Pelle, 1911, No. 1.

<sup>3</sup> American Journal of Urology, January, 1911.

The author concludes that in view of the excellent results obtained by the use of vaccines, and also of antigonococcic serum, combined with the usual local and internal forms of treatment, it is unjustifiable to subject a patient to surgical intervention, which, at best, has secured results which are practically the same as those obtained by the above-mentioned non-surgical measures.

**Septic Phlebitis of the Spermatic Cord.** Bird,<sup>1</sup> of Calcutta, reports a number of cases of this condition, which he states has been observed from time to time in Calcutta, even though it is by no means a common disease. It is apparently a pure streptococcic infection, although the portal of entry and the path which the infection follows has as yet not been determined. In the majority of the cases there is no evidence of any external wound, either scrotal or remote, and only four of the patients had hydrocele. The disease has been observed in Europeans as well as in the natives. It is sudden in onset and very rapid in development, so that death has frequently taken place as early as the eighth day in cases in which active treatment was not promptly instituted. The attack begins with a general feeling of illness, which is followed by a chill, which in turn is succeeded by high fever. Sudden severe pain develops simultaneously in one testicle and its cord, the former rapidly increasing in size and the tissues of the scrotum becoming edematous and tender. After the first or second day the cord becomes very hard and the swelling rapidly extends up the groin until its outlines are lost. Frequently the skin becomes jaundiced as early as the fourth day. Vomiting has been a fairly constant symptom. Cases have been mistaken for strangulated hernia and acute filarial infection of the cord. The *treatment*, which is surgical, must be prompt. It consists in high castration, the thickened cord being isolated at the level of the internal ring, tied, and divided. The wound is then thoroughly disinfected, left open, packed with iodoform gauze, and allowed to granulate. In cases seen sufficiently early it will not always be necessary to ligate the cord so high up. In one of the cases reported the testicle was not removed, and the patient made a good recovery. Cultures taken from the seropurulent fluid have been found to contain streptococci.

After operation, the fever subsides quickly and the signs of septicemia disappear *pari passu*, so that the patients become convalescent at the end of a week. In cases in which operation is delayed beyond the fourth day, however, and especially beyond the sixth day, the prognosis is very grave.

**Lipoma of the Spermatic Cord.** Beresnegousky,<sup>2</sup> of Tübingen, has collected 33 cases of lipoma of the cord and reported one which he observed and in which recurrence took place. He states that his case

<sup>1</sup> Indian Medical Gazette, October, 1910.

<sup>2</sup> Beiträge zur klinischen Chirurgie, October 3, 1910.



is the first of the kind on record. It was that of a man, aged forty-five years, who had had a tumor in the right side of his scrotum for three months. The patient stated that this tumor had increased in size very rapidly. At the time that he came under observation it was as big as a man's head and rather soft in consistence, although there were some areas which were harder than others. It was removed without any difficulty, and the patient made a good recovery.

Microscopic examination showed the neoplasm to be a pure lipoma. The patient remained perfectly well for four years, at the end of which time he noticed a small tumor beginning exactly like the one which he had had before. It increased in size until it became as large as one's two fists, whereupon the patient again consulted a surgeon. At the second operation the tumor, together with the testicle, was removed. It was found that there was a pyriform prolongation of the growth in the inguinal canal. Microscopic examination showed that the second neoplasm was also a pure lipoma.



# SURGERY OF THE EXTREMITIES. SHOCK. ANESTHESIA. INFECTIONS. FRACTURES AND DISLOCATIONS, AND TUMORS

By JOSEPH C. BLOODGOOD, M.D.

IN the December numbers of PROGRESSIVE MEDICINE since 1899, in addition to the discussion of the literature and my own accumulated personal experience with surgery of the extremities, I have a similar review of certain subjects which may be looked upon as problems of general surgery, for example, injuries, infections, and tumors.

For eighteen years (since 1893) I have been collecting, in the Surgical Pathological Laboratory of the Johns Hopkins University and Hospital, pathological material from the surgical clinic of the Johns Hopkins Hospital, from other hospitals, and from many outside sources. As this has accumulated (there are now 11,800 cases), the records of this material have been classified according to a scheme which has been changed with the development. Since 1906 I have followed this classification with the records in the surgical division of the St. Anges Hospital. The scheme of classification has been found to be of much practical importance for record and investigation, and as I shall follow it more closely from now on in my discussion of the literature in these contributions, it does not seem out of place to present it here in brief.

This classification has also been followed in filing my cards of surgical literature. So at the present time I not only have the records of the laboratory and a large surgical clinic, but that of the literature of surgery classified and filed according to a definite scheme.

The major divisions are as follows:

- I. Injuries.
- II. Infections.
- III. Tumors.
- IV. Lesions of Special Tissues.
- V. Lesions of Special Glands.
- VI. Lesions of Special Regions.

The subdivisions are as follows:

## **I. Injuries:**

- A. The general effect of trauma—shock.
- B. The local effect of trauma—a wound.

There is no more important problem in surgery than the general effect of trauma which, in its broadest sense, is included under the term



shock. As most authorities look upon anesthetics as toxic substances which may produce shock, I have studied anesthesia, and placed my records of these observations, with shock.

As we have discussed previously in the pages of *PROGRESSIVE MEDICINE*, there are numerous factors in *shock*. The most important are trauma, hemorrhage, psychic influences, and toxic substances. Among these toxic substances we should include anesthetics. There are others—the pancreatic ferments which produce the shock in acute hemorrhagic pancreatitis; the secretion of the thyroid gland which produces the symptom complex of Graves' disease, which closely resembles the clinical picture of shock, and many others which have been discussed and will be referred to again. But I wish to emphasize here that in clinical and experimental surgery the entire investigation of anesthesia belongs to the problem of the general effect of a trauma or shock.

The local effect of a trauma is a wound. The chief problems here are, whether the wound be accidental or operative—the prevention of infection, the checking of hemorrhage, and the closure of the wound with or without drainage to insure healing with the least injury to function.

**II. Infections.** As in injuries, so in infections, we have two main subdivisions: (*A*) The general effect of the local infection, which is included under the term general infection, for which there are many synonyms; and (*B*) the local effect of the infection. Here the chief problem is to prevent or keep within safe limits, by appropriate treatment, general infection, and the study of treatment which will effect a cure of the local infection with the least loss of function.

Local infections are due to many distinct and different agents, and treatment varies considerably with the different forms of specific infections; for example, tuberculosis, syphilis, anthrax, actinomycosis, tetanus, erysipelas, glanders, snake bites, hydrophobia, etc.

### III. Tumors:

*A.* The general effect of tumors.

*B.* The local growth of tumors.

For the general effect of neoplastic lesions we have at the present time no curative treatment, as we have to a large extent for the general effect of injuries and infections. The problem, therefore, is the recognition and appropriate treatment which will completely eradicate the local growth before metastasis has taken place. It is true that in some forms of cancer cures have been accomplished after the neighboring lymphatic glands have been involved. But the majority of authorities today look upon the involvement of the lymphatic tissue and neighboring tissues in cancer as a form of local growth.

The chief interest, therefore, of clinical and experimental investigators is directed to the recognition of tumors in their earliest local growth, and the generally accepted treatment today is excision. In the last few years clinicians especially have been interested in what may be

called the *precancerous lesions*, because extirpation in this period, if properly performed, should always accomplish a cure, and to this subject I shall devote especial attention this year.

I have subdivided tumors into the following groups:

1. Epithelial tumors, solid.
2. Epithelial tumors, cystic.
3. Benign connective-tissue tumors, solid.
4. Benign connective-tissue tumors, cystic.
5. Benign pigmented moles.
6. Malignant pigmented moles.
7. Sarcoma of the derma.
8. Sarcoma of the soft parts.

This classification places the different types of tumors, to a certain extent, according to their pathological histology (the first six groups) and according to the tissue involved (the last two groups). Experience has demonstrated that a classification along these lines places those tumors together in which the problem of diagnosis and treatment is identical.

**EPITHELIAL TUMORS.** These must first be subdivided according to their location, because in different localities, experience has demonstrated, the problem of treatment varies to a certain extent. There is a difference in the extent of the local operation and the necessity of extirpating, with the local growth, the neighboring lymphatic glands. I have found that the following subdivisions of epithelial tumors, solid and cystic, allows a more detailed investigation on these questions of diagnosis and operative treatment.

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|---|---|
| 1. Lower lip.                                       | 14. Branchial-cleft tumors in neck.                               |
| 2. Upper lip.                                       | 15. Metastatic tumors in glands of neck, primary tumor unknown.   |
| 3. Face and cheek.                                  | 16. Upper extremity.  |
| 4. Chin.  | 17. Metastatic glands in axilla, primary lesion unknown.          |
| 5. Eyelid.  | 18. Lower extremity.  |
| 6. Ear.   | 19. Metastatic tumors of glands of groin, primary lesion unknown. |
| 7. Nose.  | 20. Penis.  |
| 8. Scalp and forehead.                              | 21. Vulva.  |
| 9. Mucous membrane of mouth, jaws, and hard palate. | 22. Skin of body.   |
| 10. Tonsils and soft palate.                        | 23. Skin of perineum and region of <b>anus</b> .                  |
| 11. Larynx.   |   |
| 12. Tongue.   |   |
| 13. Skin of neck.                                   |   |

For example, the problem in epithelial tumors of the lip, as compared with those of the face and cheek, could never be properly investigated unless the records were kept separately. In epithelial tumors of the lip, the study of ultimate results has demonstrated that, with the rarest exceptions, the local operation should be combined with a thorough extirpation of the lymphatic glands and tissues of the neck, subparotid,

sublingual, and submental, while the reverse is true of epithelial tumors of the face and cheek. In epithelial tumors of the mucous membrane of the gum, the jaw should be resected along with the local extirpation of the lymphatic glands, while in the tongue recent experience of my own has shown that surgeons have erred in taking more of the tongue than was necessary and performing a very extensive dissection of the glands of the neck, restricting their operation in the floor of the mouth—an area which, to accomplish a cure, should be more widely excised than either tongue or cervical glands. But in this periodical I must confine myself chiefly to the epithelial tumors of the extremities.

**IV. Lesions of Special Tissues.** In surgery of the extremities, the special tissues to be discussed in a critical review are the skin and subcutaneous fascia, the tendons and nerves, muscle, bursæ, and joints, bone, blood, and lymphatic vessels.

With the special tissues in particular we must also group our subjects into the results of injury, infection, and tumors.

**V. Lesions of Special Glands.** In the extremities, the only special glands to be considered are the lymphatic.

**VI. Lesions of Special Regions.** For purposes of differential diagnosis it is important to group together the different pathological lesions that may appear in the region of the hip and groin, the thigh, the popliteal space and knee, the leg, the ankle, and the foot. It is helpful in diagnosis to be familiar, to a certain extent, with the possibilities. In the upper extremity the following anatomical regions may be distinguished: Subclavicular area, axilla, shoulder, arm, elbow, forearm, wrist, hand, and fingers.

Space forbids in this issue to discuss the regional differential diagnoses, but I have been collecting for years a cross-index of the various pathological conditions that may appear in the different regions, and I trust in a future issue to discuss the questions from that different standpoint.

## INJURIES

There are two direct effects of an injury: The general, which is included under the broad term "shock," and the local effect to which the term "wound" applies.

**Shock.** We distinguish shock in accidental wounds and in wounds produced by operation. In this type of shock the chief factors are trauma, hemorrhage, and psychic influences. In addition to traumatic and operative shock, we must learn to recognize shock associated with disease. In most of these instances the general condition of the patient is due to some toxic substance, and in this variety of shock we must include the condition produced by anesthesia.

In the previous numbers of *PROGRESSIVE MEDICINE* I have attempted to keep up a critical review of the literature. Although this subject is



constantly in the mind of the surgeon, yet the contributions to this important problem are scanty. The problem may be studied in the laboratory as one of physiology or experimental surgery, or at the bedside or in the operating room.

As with all problems in surgery, the investigation may be along experimental or clinical lines. In spite of these investigations, there is yet by no means a uniform opinion as to the exact factors in shock, as to its anatomical basis, or its physiology, or as to its treatment. In my opinion, the practical problem consists of means to determine the diagnosis of this condition and to discover measures of treatment which will allow one to prevent shock and to keep it within safe limits.

Whether the shock be due to an accidental or an operative wound, or to some pathological lesion, the clinical picture is very much the same. The only instrument of precision we have at the present time to estimate the degree of shock is the blood pressure apparatus. Careful observation of the rate and character of the pulse and of the respiration is also helpful. So that surgeons and physicians of experience soon learn to recognize shock and its degrees from the clinical picture in all its details, and this, of course, is the practical side of the question.

**HEMORRHAGIC FACTOR.** In shock associated with accidental wounds the hemorrhagic factor must at once be estimated, if possible. It is often difficult to tell how much blood the patient has lost from the wounds, unless the surgeon was present at the time of their infliction or immediately afterward. Again, the hemorrhage may be internal. In accidental cases, therefore, if the shock is extreme, intravenous infusion of salt solution and, in more severe cases, direct transfusion of blood should be employed at once. It is beneficial when the shock is not associated with hemorrhage; it is life-saving when there is a hemorrhagic factor. Blood transfusion in extreme cases, where there is a possibility of internal hemorrhage, but no positive sign, is also of diagnostic value, because if the shock is due entirely to trauma the patient will react, and there will be no recurrence of the symptoms of shock; but if internal hemorrhage is still continuing, there will be a recurrence of the symptoms in a short time. I have recently had an observation of this kind. The patient, a boy, was run over by a heavy truck which passed over his thigh and abdomen. The shock was extreme. There was no external hemorrhage from the lacerated wound in the thigh, or signs of a hematoma about the fractured femur, nor was there any movable dulness in the abdomen. This boy reacted to a blood transfusion, but within one-half hour the symptoms of grave shock returned, and there appeared an area of dulness over the crest of the ilium in the iliac fossa. I concluded from this picture that there was a fracture of the pelvis with rupture and a continuous hemorrhage behind the peritoneum inaccessible to treatment. The autopsy proved this to be true.

There is no need to discuss here in detail why and how all bleeding should be stopped in all accidental cases if possible.

**TRAUMATIC FACTOR.** The other factor in accidental wounds—traumatism—has acted and produced its results before the surgeon has any opportunity for treatment, but the wound itself may be painful, and the condition of the tissues in the wound may be keeping up painful impulses. Pain, therefore, should be always relieved by morphine. If there is a painful fracture or dislocation, it should be reduced at once, or if the limb, lacerated beyond hope of saving it, is keeping up the shock, it should be rapidly amputated.

**PSYCHIC FACTOR.** The psychic factor of shock due to accidental injury can be relieved by morphine and the encouraging influence of sympathetic, gentle, and efficacious treatment. No operation should be performed during the condition of shock associated with an accidental wound, unless its object is to check hemorrhage, relieve pain, or when delay has an element of danger due to other factors, for example, a perforation of the intestine, or extravasation of urine from a ruptured bladder or urethra. The essential things in the treatment of accidental shock, in addition to those already noted, are the position of the patient with head low, absolute quiet, elevation of temperature with artificial heat. The majority of authorities are of the opinion that stimulants, such as alcohol, strychnine, digitalis, etc., are contraindicated. If acute dilatation of the heart threatens, adrenalin should be given with the intravenous salt infusion. But our treatment today of acute dilatation of the heart is by no means satisfactory.

**SHOCK IN OPERATION.** In shock due to operation, the hemorrhagic factor, as a rule, can be controlled. The traumatic factor is under control to a certain degree, but very often manipulations are necessary which, of themselves, produce shock. These, of course, should be reduced to a minimum. The problem here is, What is the best anesthetic during those manipulations which, we know, increase shock? This I will discuss under anesthesia.

The psychic factor in operative shock varies. It is always present to a certain degree, even in normal individuals. It is most marked in certain diseases, for example, exophthalmic goitre.

The art and science of operative surgery lies in the estimation of the condition of the patient before and during operation to such an accurate degree that the necessary operation can be done within safe limits. When this is accomplished, death from shock never takes place from operation.

**TOXIC SHOCK.** Shock due to disease (toxic shock) must be considered in the accident case, because the individual may have some pathological lesion which lowers his resistance to the traumatic, hemorrhagic, and psychic factors of the shock due to the accidental wound. In such individuals the reaction is out of proportion to the injury, treatment

does not give as prompt results, and fatalities are more common. In operations, the toxic factor of the disease for which the operation is indicated, or of other lesions which may be associated with it, must always be considered. The pathological conditions which lower the patient's resistance to accidental and operative shock are numerous. The most important are anemia, diabetes, jaundice, cardiac lesions, lesions of the lung which interfere with respiration, lesions of the kidney with lowered function, chronic alcoholism, cirrhosis of the liver, exophthalmic goitre, toxemia from general infection, toxemia from intestinal obstruction, acute dilatation of the stomach, and starvation.

Experience has demonstrated that when the operation is instituted to relieve the patient of one of these factors, its dangers are much less than when the operation is for some other condition which of itself is not producing shock. For example, an operation for cancer of the breast, or non-strangulated hernia, in a patient suffering from any of the above mentioned lesions, would not relieve the patient of the toxic factor of the disease, and such an operation would be much more dangerous than upon a normal individual. It is essential to bear this in mind in considering what Meltzer terms the "factors of safety" in operative interference.

There is very little recent literature on these problems. For example, in the contribution by Arthur R. Cushny<sup>1</sup> on the therapeutics of digitalis and its allies, I find nothing which would encourage a surgeon to employ this drug in shock. He remarks in his conclusions that "in the course of this investigation I have been struck by the small amount of accurate knowledge that we possess as to practical therapeutics." This confirms my statement that we have no accurate knowledge which would encourage surgeons to employ digitalis in surgical shock, even if it were associated with cardiac lesions.

Harold C. Bailey<sup>2</sup> calls attention to the toxic action of digitalis on the heart. Apparently further clinical experience and experimental investigation confirm the view which some years ago was held by only a minority of surgeons that stimulants of all kinds—strychnine, digitalis, alcohol—are contraindicated in shock.

**ANAPHYLACTIC SHOCK.** Wilfred H. Manwaring<sup>3</sup> employs this term to designate the general condition of the animal produced by repeated doses of foreign serum. It may be looked upon as an example of toxic shock. Anaphylaxis will be again discussed under the serum treatment of hemorrhage and infections.

**ANATOMICAL BASIS OF SHOCK.** At a recent meeting of the Clinical Society of Surgery, in Cleveland, we were instructingly entertained two days by Dr. Crile and his associates. The chief theme was the general condition of the patient in relation to accidental and operative wounds,

<sup>1</sup> American Journal of the Medical Sciences, 1911, cxli, 469.

<sup>2</sup> Ibid., cxlii, 183.

<sup>3</sup> Johns Hopkins Hospital Bulletin, 1910, xxi, 275.



to psychic influences, and to disease. The literature of this subject has been discussed in *PROGRESSIVE MEDICINE* since 1899. The larger contributor to this most important subject has been George W. Crile, of Cleveland. His last investigation resulted in the discovery, apparently, of an anatomical basis for shock. Crile and his co-workers are of the opinion that all of the factors in shock affect chiefly the nervous system, especially the cells of the higher nerve centres, while those of the spinal cord are least affected. In *PROGRESSIVE MEDICINE* for December, 1910 (p. 163), I discussed the last contribution of Crile on the neuropathological cytology of anemia, infections, Graves' disease, and shock. So there is little further to be said, except to give the impression made upon the members of the Clinical Society of Surgery by this two days' demonstration in the operating room and laboratories in which practically the only theme considered was the anatomical basis of shock, the factors which produce shock, the questions of prevention and treatment.

The impression I got—and I am inclined to the view that it was general—was that, whether one agreed or not as to the anatomical basis of shock portrayed by Crile and his colleagues, it furnishes a good working basis for the recognition, prevention, and treatment of shock.

Crile certainly demonstrates by his own work and results that the surgeon who has constantly in mind the general condition of the patient, and who throughout the entire treatment of that patient endeavors to reduce to a minimum those influences which have a deleterious effect upon the patient's nervous system, is the better surgeon. Such a surgeon has a lower mortality, his patients have less postoperative discomforts, fewer pre-operative anxieties, and a minimum of postoperative psychoses or neurasthenia.

It has been the fault of medicine in the past to concentrate its attention on the local disease and to overlook its effect upon the general condition of the patient. In surgery today this broader view or conception is becoming more and more evident and its practical results are by no means concealed.

This problem shock has grown too large to be overlooked. In fact, it may be considered the largest problem in surgery today.

## ANESTHESIA

Anesthesia is undoubtedly a problem in shock and surgical physiology. There is still a great difference in opinions in regard to the choice of the anesthetic. The majority of surgeons today employ ether by the drop method on the open cone as the anesthetic of choice. In a few clinics during recent years nitrous oxide and oxygen without or with ether has

replaced ether as the routine anesthetic. Chloroform is the anesthetic of choice in but very few clinics. In obstetrics, chloroform still holds its place. A few surgeons employ spinal anesthesia very extensively. The majority of surgeons for various reasons have not accepted this method even in selected cases. Local anesthesia by the various methods has not lost its place, but apparently nitrous-oxide-and-oxygen anesthesia is reducing the number of cases in which local anesthesia is employed.

There is no doubt that surgeons are exhibiting a growing respect for anesthesia. They more and more are of the opinion that the choice of the anesthetic and the technique of its administration influence mortality and postoperative complications and discomforts more than any other factor in the surgical operation. At the present writing the greatest interest is taken in nitrous-oxide-and-oxygen anesthesia.

The subject of anesthesia was given a day at the last meeting of the American Surgical Association.<sup>1</sup> Bevan, of Chicago, discussed the choice of the anesthetic. Moore, of Minneapolis, explained why, after thirty years' experience with chloroform, he now employs ether. Gatch,<sup>2</sup> of Baltimore, gave his experience with his method in Prof. Halsted's clinic of the Johns Hopkins Hospital, explained his own apparatus, and devoted considerable attention to the value of rebreathing. Meltzer,<sup>3</sup> whose method I have previously discussed, sent his paper, which was read by title, and also gave a review of the essential features of intratracheal insufflation as a method of anesthesia. Yandell Henderson,<sup>4</sup> of New Haven, in a paper entitled "Fatalities Simulating Status Lymphaticus, Induced in Normal Subjects by Intermittent Ether Anesthesia," discussed his view of the relation of acapnia to shock and anesthesia. This is the first time for years that anesthesia has been given so much attention by the American Surgical Association. Allen<sup>5</sup> gives his views on nitrous-oxide anesthesia and its sequences.

In Gatch's<sup>6</sup> paper some of the more important references to the recent literature will be found. In addition, I would like to call attention to the following references which clearly show the great interest that this method is exciting all over the world: Wm. D. Haggard,<sup>7</sup> E. G. Martin,<sup>8</sup> George W. Crile,<sup>9</sup> Van Kaathoven,<sup>10</sup> M. Neu.<sup>11</sup>

<sup>1</sup> *Annals of Surgery*, 1911, liv, 415.

<sup>2</sup> *Journal of the American Medical Association*, 1911, lvii, 1593.

<sup>3</sup> *Journal of the American Medical Association*, 1911, lvii, 521, and *Surgery, Gynecology, and Obstetrics*, 1911, xiii, 220.

<sup>4</sup> *Annals of Surgery*, 1911, liv, 418.

<sup>5</sup> *Journal of the American Medical Association*, 1911, lvii, 1599.

<sup>6</sup> *Loc. cit.*

<sup>7</sup> *Journal of the American Medical Association*, 1910, lv, 2225.

<sup>8</sup> *Ibid.*, 1911, lvii, 1115.

<sup>9</sup> *Surgery, Gynecology, and Obstetrics*, 1911, xiii, 170.

<sup>10</sup> *Annals of Surgery*, 1908, xlviii, 435.

<sup>11</sup> *Centralbl. f. Chir.*, 1911, xxxviii, 42 Supplement, p. 16, and *Archiv f. klin. Chir.*, 1911, xc, p. 550.

**Nitrous-oxide-and-oxygen Anesthesia.** In my personal experience with nitrous-oxide-and-oxygen anesthesia I have become convinced of its value. I am not prepared to say that it is the safest anesthesia in every instance, but, with few exceptions, it should be the anesthesia of choice. Although it is the best anesthesia for the patient, it is not the most convenient for the surgeon. In this method of anesthesia there should be no cyanosis, but muscular relaxation is not as extreme as in ether or chloroform, and the surgeon will have to reëducate himself to overcome this difficulty.

At least one-half hour before anesthesia is to be given, the patient should receive a hypodermic injection of morphine of an average dose of  $\frac{1}{6}$  grain, and atropine,  $\frac{1}{150}$  grain. The patient is placed comfortably on the operating table, the upper and lower limbs are fixed in an easy position, the field of operation is prepared, the surgeon and his assistants are ready gowned and gloved; the anesthetic should then be begun, and one should expect sufficient anesthesia for a skin incision within a few minutes, at the most three to five minutes. If anesthesia is not complete then, a few drops of ether should be given. It is better never to produce cyanosis. Success depends upon a proper combination of oxygen and nitrous oxide without the admixture of air. Later rebreathing by the method of Gatch is helpful in maintaining a more quiet narcosis. When manipulations are required which wake up the patient or disturb the quiet anesthesia, it may be necessary, in some cases, to again give a few drops of ether. Crile attempts to forestall this reflex disturbance by infiltration of the tissue in the neighborhood of the field of operation with 1 to 400 novocain.

The majority of surgical operations, I believe, can be performed with this method of anesthesia. I trust that future experience will enable us to get along without ether in a greater number of cases and with less ether in the few cases which at the present time require it.

I am confident that with handicapped patients the operative mortality and postoperative complications will be distinctly less. With all cases the convalescence after operation will be more comfortable. The only way to develop the technique of nitrous-oxide-and-oxygen anesthesia in any clinic is to employ it in all cases. One at first may feel that the patient under this method of anesthesia is not doing so well as under ether; the pulse may be more rapid, and toward the end of a long critical operation the blood pressure may be lower, but it is to be remembered that the moment that the nitrous-oxide-and-oxygen anesthesia ceases the patient begins to react. After operations under ether or chloroform the patient not only has to recover from the shock of the operation, but eliminate the toxic anesthetic.

Lack of space forbids further discussion, but I should advise every surgeon to give this method of anesthesia careful consideration and introduce it in his clinic.



## WOUNDS

The local effect of an injury or trauma is a wound. Wounds must be divided into accidental and operative, because in operative wounds the surgeon controls and prevents infection and controls hemorrhage. Practically these two complications of a wound have been eliminated by operative technique. In an accidental wound, the infection has taken place and hemorrhage has begun before the surgeon has an opportunity of preventing either. A recent conclusion of some investigator on this subject states that, in operative wounds, prevention of infection has almost reached certainty, while it is a question in accidental wounds whether we are any nearer the solution of the problem than our predecessors at the time of Lister and before him.

The classification of accidental wounds into subcutaneous, closed wounds, or contusions, and into open ones is of interest chiefly in relation to infection.

**The Immediate Effects of Wounds.** The moment tissue is lacerated and this laceration extends to the epidermal or mucous membrane surface, we have certain effects secondary to the laceration: Hemorrhage, a portal entrance for infection has been made, the lacerated tissue may have good or poor circulation, and interference with function varies with the degree of laceration and the tissue lacerated. As a rule, there is pain.

In the treatment, therefore, of wounds we first bear in mind the relation of this trauma to the general condition of the patient, and this, unless there is local hemorrhage, must be treated first. Therefore, in the immediate treatment of a fresh wound we must study the best methods of checking hemorrhage, of reducing the danger of infection, or restoring circulation to the lacerated tissue, or relieving pain, and restoring function. It should be our ultimate object in the treatment of such a wound to restore things as far as possible to their condition prior to the infliction of the wound.

Now, as to a wound in its relation to a portal of entrance for infection, I shall discuss this later. We have, therefore, here chiefly the problem of checking hemorrhage and getting a restoration of the lacerated tissue to such a position that healing will take place with perfect restoration of function.

**First Aid to the Injured.** I was requested within a few days by a police surgeon to look over what he had written for the instruction of police officers in regard to the first treatment of wounds. I found that he had made the mistake that recurs again and again in the history of surgery—interference. The most important factor in the first treatment of a wound is non-interference. The open wound should be immediately covered with the cleanest piece of material available

and bandaged. If the hemorrhage is not controlled by this bandage, an Esmarch should be placed above if the wound is on the extremity. No other directions are necessary, except in cases of fracture. Then there should be some instruction how to fix the fractured limb in a comfortable position. In fractures of the arm, the patient, as a rule, finds out for himself how to carry the injured limb in the most comfortable position. In fractures of the leg, the injured individual should be placed flat on the back, the injured leg pulled gently and firmly (extension), covered with a blanket or some other padding, and held in this position by two pieces of board fixed with a bandage.

If there is to be interference, it should only be done by an experienced surgeon under proper environment, and this will be discussed later under the subject of prevention of infection in the region of the wound.

**Hemorrhage.** In *PROGRESSIVE MEDICINE* for December of last year I drew attention to the most recent literature and since then nothing of great importance has appeared. Apparently direct transfusion is gaining ground, and the serum treatment seems more effective than gelatin or various drugs.

**Laceration of Tissue.** When the injured person comes under the observation of the surgeon, the latter should make every endeavor to ascertain what tissues have been injured. First, bloodvessels should be examined. I have discussed in this journal the possibility of contusion of an artery with rupture of the intima which leads to thrombosis, and, in some instances, to gangrene when certain arteries are injured. An immediate recognition of this injury will allow a surgeon to expose the artery, resect, and suture. Bloodvessel surgery has passed beyond the stage of animal experimentation, and is available for recent traumatic surgery as well as for chronic lesions. The technique of vessel anastomosis has been discussed here. Recent literature adds new cases, but no new features. Next, there should be an investigation as to injury of nerves, because the immediate suture of a divided nerve saves the patient much time, and the probabilities of perfect regeneration are better. Most frequently lacerated tendons, ligaments, and capsules about joints are overlooked. Here there is required immediate suture or fixation. The treatment of the fractured bone will be discussed under fractures.

## INFECTIONS

As in injuries, so in infections there is the local and general result. In some cases the local reaction at the portal of entrance is so slight that it may be difficult to distinguish it, or the slight inflammatory process may have healed, yet the patient exhibits all the signs of general infection, or there may be some signs of lymphangitis, or lymphadenitis above the healed focus. In such instances nothing pre-

ventive can be done for the local infection--the invaders have entered, and the combat now becomes an internal and not an external one.

I wish to discuss the problems of the treatment of local and general infection from an entirely practical standpoint. We have no new specific sera, and the treatment of infections by vaccines seems to be absolutely valueless in the very acute infection, and even of unquestionable value in the chronic.

**Are Lymph Glands Filters?** In the majority of text-books and in much of even recent literature one gets the impression that the lymph glands possess great inherent powers of retaining the bacteria received through the lymph vessels from the portal of entrance. That is, mechanically they act as filters, and, in addition, due to the local action of the special cells and sera of the lymph glands, bacteria are destroyed.

In my surgical experience I have been unable to confirm this view. I have always looked upon lymphangitis and lymphadenitis as a definite clinical sign that the infection has passed from the local focus or portal of entrance and is becoming general, and that the appearance of involvement of the lymph vessels and glands should be looked upon, in the majority of cases, as a definite indication for more energetic treatment toward the local infection. The involvement of the neighboring lymphatic vessels and glands is a sign that the resistance of the individual at the portal of entrance is not sufficient. Bacteria are entering the body and the danger of a general infection is greater.

Surgeons frequently see a small infected area on the finger with red lines of lymphangitis extending up the arm and tender and palpable glands in the axilla. It would be unwise and dangerous to depend upon the axillary glands to filter and destroy these bacteria. Accumulated experience has shown that if the local infection on the finger is excised early enough after the involvement of the lymph glands, the lymphangitis will disappear sometimes in a few hours, and the tender, swollen glands will quickly subside. When the radical treatment of the local infection is not instituted promptly enough, the lymphangitis may continue and spread into a cellulitis, and the glands suppurate.

Noetzel,<sup>1</sup> after very careful experimental work, has shown that in the majority of instances a local infection becomes general through the lymphatic vessels and glands, rarely through primary direct involvement of the bloodvessels. He has also proved that the number of bacteria actually filtered by the lymph glands is insignificant; that when an infection reaches the lymph glands it always gets into the general circulation. This experimental work, therefore, confirms surgical experience. We must not depend upon the lymph glands as filters, and, to repeat, we must look upon lymphangitis and lymphadenitis as the first sign of general infection.

<sup>1</sup> Beitr. z. klin. Chir., 1909, lxx, 372.



**General Infection.** In the modern conception of an infection there must be a portal of entrance. As a rule, at the portal of entrance the tissues react to the irritation of the toxin or bacteria, and the inflammatory process—the result of this irritation—gives rise to a palpable, visible focus or lesion, which may be called the primary focus. The character and extent of this primary focus differs with the different toxins and bacteria, with the tissues involved; it also shows changes in different individuals, due to the inherent or acquired resistance. We also notice quite marked differences in the primary focus in individuals who are handicapped by certain diseases; for example, chronic alcoholism, diabetes, nephritis, arteriosclerosis, etc.

In the treatment of lymphangitis and lymphadenitis, which must be looked upon as the first expression of a general infection, we must be familiar with the different characteristics of the local infection, because the most important factor in the treatment of lymphangitis and lymphadenitis is their prevention.

This is due to the fact that the measures which have been developed up to the present time for the direct treatment of lymphangitis and lymphadenitis are inadequate as compared with the methods of treatment for the local infection.

It can be easily seen that in many instances the local infection can be completely excised. This is the ideal treatment, and, if performed in time, will absolutely prevent general infection. But, in some instances, efficacious treatment need be less radical for the primary focus than complete excision.

In discussing the treatment of lymphangitis and lymphadenitis, which in the majority of instances are secondary infections, one must emphasize the importance of the primary focus, and clearly point out the methods of treatment which will prevent extension from the primary focus to the lymphatic vessels and glands.

By a general infection is meant the extension of toxins or bacteria through the lymph or bloodvessels into the general circulation and their dissemination throughout the tissues of the body.

When no bacteria are present, the general infection is called a *toxemia*. When bacteria are present in the blood and tissues, the condition is called *bacteriemia*. There are two groups of general bacteriemic infection, one without and one with metastatic secondary foci or abscesses. In many local infections, the first secondary or metastatic infection is in the neighboring lymphatic glands with or without suppuration, or, it may be nearer the primary focus, in which case the local condition is called *cellulitis*.

In every infection in which there is a primary focus there is an opportunity to institute treatment before the infection has become general. This is the most opportune time for successful treatment. In the second period the infection has become general, but the symptoms

may immediately disappear after the proper treatment of the primary focus. In these two groups treatment may be confined to the primary focus only. In the third group the general infection is of such a character, or has existed long enough to have become established as a definite secondary focus. Now the treatment of the primary focus alone is not sufficient.

**Treatment of the Primary Focus.** Great emphasis must again and again be placed upon the importance of the proper treatment, in the proper time, of the primary focus. Only in this way can the more grave complications—lymphangitis, lymphadenitis, and the different forms of general infection—be prevented. Our methods of treatment, when the infection has passed beyond the primary focus, are conspicuous by their insufficiency, as compared with the treatment of the primary focus before these complications have set in.

When the primary focus cannot be recognized or the inflammatory process has subsided or healed when the individual comes under treatment, then, of course, we are forced to confine our treatment to the general condition.

**Character of the Primary Focus.** Experience has shown that in some cases the primary focus should be excised, in others incised; in still others the method of treatment is non-operative, at least at first.

In the treatment of the primary focus we have two dangers to avert. One of these is the local extension of the primary focus which may do harm by destruction of tissue with its resultant loss of function. The second danger has been discussed—that of general infection.

For example, in a stab wound of the knee-joint which has become infected, the indications for energetic treatment are to save the function of the joint, which would be destroyed by a purulent arthritis, as well as to save the patient from general infection, which will very likely ensue if a purulent arthritis followed the stab wound.

The modern treatment of the primary focus, as well as that of lymphangitis and lymphadenitis, depends upon a proper conception of the inflammatory process. This has been clearly shown by Bier in his contributions on hyperemia, and in the recent literature on inflammation and immunity.

**The Inflammatory Process.** This consists of a reaction on the part of the cellular tissues and fluids at the portal of entrance, with the production of a new tissue which is quite vascular—granulation tissue. The most conspicuous clinical sign of the inflammatory process is increased vascularity, and, later, stasis of the blood current. In the early infection the swollen tissues are red, later bluish. The second marked clinical feature is swelling. This is first due to the collection of serum in the inflamed tissue, later to cellular hypertrophy (granulation tissue), and still later, in some instances, to the collection of pus—suppuration.

According to Welch, most pathological processes are adaptive, that is, they have a distinct purpose. The inflammatory process in many instances accomplishes the neutralization of the toxins and the destruction of the bacteria. We have accumulated evidence of the power of the tissues to take care of the infected focus.

In the treatment of the primary focus and its secondary complications—lymphangitis and lymphadenitis—one must always bear in mind this now well-known fact, that the tissues and fluids of the body possess to a certain degree the power to take care of infections and accomplish the healing without aid.

In the scheme of treatment only those measures should be employed which aid the inflammatory process. The most important is the circulation to and from the infected area.

At least, we have means of aiding the phenomena of circulation in the infected area more than any other of the different phenomena in inflammation.

Welch<sup>1</sup> has clearly and forcibly explained adaptation in pathological processes. Adami, in his contribution on inflammation, has shown that the inflammatory process may be sufficient for the purpose of healing the non-infected wound, on one hand, or resisting the infection of the wound, on the other. In many instances, the inflammatory process may be insufficient. In cryptogenic infections and in all local infections in which the inflammatory process at the portal of entrance does not protect against general infection, we may consider the inflammatory process to be insufficient. In other cases the reaction is excessive. When this takes place in the uninfected wound, we see the granulation-tissue tumor, the increased scar tissue or keloid, and the excessive callus in fractures. In the infected wound the destruction of tissue is more extensive and pus formation more marked. Gangrene may be looked upon as an excessive phenomenon in the inflammatory process. Thrombosis is injurious to the adaptability of the inflammatory process, either in the healing of the wound, or the combating of the infection. Yet, in some instances, thrombosis is essential to prevent primary or secondary hemorrhage, so that, to a certain extent, it is helpful and therefore has an adaptive purpose.

**Bier's Hyperemia.** For centuries, in the treatment of infected wounds and infections, clinicians have observed the healing value of hot applications which increase the circulatory phenomena in the circulation. Bier, who has written extensively, bases his active and passive hyperemia on physiological and pathological evidence as well as clinical observation.

The circulatory phenomena of inflammation may be increased by active hyperemia. This is accomplished by some form of counter-

<sup>1</sup>Transactions of the Congress of American Physicians and Surgeons, 1897



irritant, or the direct application of moist or dry heat. Passive hyperemia is brought about by placing a rubber bandage slightly constricting the veins above the infected area. This bandage should be of light rubber (the Martin bandage), it should constrict very lightly only, it should never interfere with the arterial circulation, and it should never be sufficiently tight to cause pain. The bandage is left on for a certain number of hours and then removed. The time which the bandage is on and off varies with the nature of the infection. In acute infections the change should be more frequent, and the time on and off of less duration; in chronic infections, the time that the bandage is on should be longer (four to eight hours) and off a shorter period—one to two hours.

The theory of the effect of increased circulation, either by active or passive hyperemia, is that the increased circulation nourishes better the cells which must combat the infection and also brings to the infected part substances which are produced elsewhere in the tissues or fluids (immune bodies). The function of these immune substances is now well understood. The increased circulation also aids in draining from the infected part substances or bodies which will be harmful if they accumulated there, and which are less harmful when diluted in the blood and lymph current, and which can be eliminated by the excretory organs.

Apparently the immune substances are produced in the infected area itself as well as in other parts of the body. The latter are brought to the infected area by the circulation.

**Immunity.** This process or phenomenon, which has for its object the neutralization or destruction of the causative agents of infection, is by no means understood, and at the present time the ideal treatment for a local infection and its complication—general infection—is by no means established. This ideal treatment would be some form of vaccination or antitoxin.

*Diphtheria.* For diphtheria and for the diphtheritic infection of wounds due to the bacillus of diphtheria we have an antitoxin.

*Tetanus.* The antitoxin of tetanus is much more efficacious before the clinical symptoms of the disease are established. In all wounds in which this infection is likely the antitoxin should be given at once.

*Syphilis.* For the primary syphilitic chancre and for the general infection of syphilis in any of its stages we have had for years efficacious therapeutic agents—mercury and iodide of potassium; and now an apparently much more certain drug—Ehrlich's salvarsan ("606"). The possibility of syphilis as the cause of the primary focus and secondary lymphadenitis must always be borne in mind. The test is the Wassermann reaction, and the treatment is general, not local. This is a very important clinical point to emphasize. A syphilitic ulcer of the tongue with lymphadenitis of the glands of the neck is not infrequent. It

is often a precancerous lesion. Local treatment is of no value, and the specific treatment must be given.

*Anthrax.* For anthrax it is questionable whether the serum is really specific.

*Cerebrospinal Meningitis.* Cerebrospinal meningitis, which now has a curative serum (Flexner's), does not manifest itself clinically with a primary focus and secondary lymphadenitis before the symptoms of cerebrospinal meningitis develop.

For the common organisms found in the primary focus and which may produce general infection we have today no curative sera which can be depended upon. The treatment by vaccinations made from the organism producing the infection as developed by Wright, in England, has not accomplished the expected results in acute infection. In my own experience, I have been unable to convince myself that one should ever depend upon this vaccination. Rufus I. Cole, in his extensive investigations in the Medical Clinic of the Johns Hopkins Hospital and University, was unable to confirm Wright's work. Geraghty and others have also been disappointed with the vaccine treatment of gonorrheal infection.

Until the phenomena of immunity are more thoroughly worked out, and until we have curative sera of a value in all infections equal to that for diphtheria or a curative drug equal to salvarsan in syphilis or quinine in malaria, we must depend upon other means which investigation and experience have developed to aid nature in combating infections.

Today we can combat infections by educating the public how to better protect themselves against wounds which act as portals of entrance, and in the treatment of wounds immediately after their injury in such a way that the danger of an infection is reduced to a minimum. When the infection has taken place locally, we must instruct the public on the importance of immediate treatment of the primary focus and instruct ourselves on the methods which will give greater assurance against the danger of the infection in the primary focus becoming general.

In spite of this we shall meet lymphangitis and lymphadenitis and other manifestations of general infection, and for this reason we must attempt to improve our measures for the treatment of these conditions.

**Preventive Measures.** The danger of an anthrax infection is to be found chiefly among woolsorters, and there should be laws made to enforce the disinfection of hides.

The public and the profession must be educated to the importance of the prophylactic injection of the antitoxin of tetanus in accidental wounds. Patients suffering with diabetes, arteriosclerosis, nephritis, and chronic alcoholism should be told of the greater danger of slight wounds—for example, the cutting of corns, the blister of a tight shoe.

the apparently innocent prick of a pin or needle, a small bruise or cut. In such individuals with lowered resistance these wounds, insignificant in the normal individual, become the local focus of an infection which may rapidly extend to lymphadenitis and lymphangitis, or thrombosis and gangrene.

**Protective Vaccine.** It would be fortunate if we had more vaccines which would protect against the various infections. Vaccination for smallpox is well established; vaccination for typhoid should be employed more universally. If a laboratory investigator is working with cultures of diphtheria, tetanus, or typhoid, he should protect himself. For the other infections we have no means of protection at this time.

**Treatment of Recent Wounds.** The open wound, either in skin or mucous membrane, is always a portal of entrance. For the primary infection which takes place at the moment of the infliction of the wound we have no means of prevention. This primary infection must always be borne in mind. In the accumulated literature on gunshot wounds in military surgery, the dangers of secondary infection are given too great prominence, and the possibilities of primary infection not sufficient emphasis. I agree with von Reyher<sup>1</sup> that the possibilities of primary infection in recent wounds, bullet and other forms, must be borne in mind. The source of infection, the skin and clothes of the injured individual, the foreign body producing the wound. The locality in which the wound was received is sometimes a very important feature. In all wounds soiled with earth, tetanus must be thought of and the antitoxin given. When the wound is inflicted near hides and wool, the possibility of anthrax is an indication for the immediate disinfection of the wound with pure carbolic or the Paquelin cautery. Surgeons who are injured during operations on infected cases, and pathologists in autopsies on infected cases, run great risks from the primary infection.

**Treatment of the Primary Infection.** In the ordinary wound with the ordinary primary infection there is not much danger. All that is necessary is slight cleansing with hot water, alcohol, or, the more recent technique, tincture of iodine (5 per cent. solution). Then the wound should be closed, if necessary, with the proper precautions, and protected with a sterile dressing.

In those cases in which one is quite certain that the wound has been infected with an organism of great virulence and in large numbers, the measures should be much more energetic. Everyone should be educated, after receiving such a wound, to immediately place an Esmarch bandage absolutely occluding return circulation above the wound. The wound then should be enlarged if necessary, and allowed to bleed for five or ten minutes; it then should be disinfected with pure carbolic acid or with the cautery. The Esmarch should be gradually loosened, but not removed for some hours.

<sup>1</sup> Archiv f. klin. Chir., 1910, lxxxviii, 576, and 1910, xci, 932.



In every wound, no matter what the degree of the infection, bacteria enter and reach the circulation, at least through the lymph vessels, perhaps, in some instances, through the bloodvessels. In the ordinary case, these bacteria are destroyed, the wound heals, and there is no evidence of general infection. It is quite possible that some of the bacteria which have entered in this way may lodge in a lymph gland, in the bone marrow, or some organ, remain latent, and later on give rise to a secondary metastatic focus at that point. In such cases the primary focus is overlooked.

*Cryptogenic Infections.* In other instances there is no reaction on the part of the local wound at the point of entrance, but in a few hours a lymphangitis and lymphadenitis, in some cases associated with a thrombosis of the superficial veins, appear, with signs of general infection. This form of cryptogenic infection is rare and is often fatal. It is an expression not only of an infection with an organism of great virulence, but of an individual with low resistance. It is a question whether there should be any operative interference in a case of this kind. I will mention this again later.

In another case there is no lymphangitis and no phlebitis with thrombosis, but the neighboring axillary glands become large and tender. With a clinical picture of this kind, the prognosis is better than with the one previously discussed and associated with phlebitis and lymphangitis. The question to be decided is, Shall the infected glands immediately be removed. From my own experience and from the literature I find that this question cannot be answered in a general way, but interference or non-interference depends upon numerous factors which I will try to bring out later.

In another type of cryptogenic infection there is no reaction either locally or in part of the neighboring lymphatic vessels or glands, but signs of a general infection. These cases are rare and usually fatal.

I have illustrated these types of so-called cryptogenic infections, because, in the treatment, no opportunity is offered to attack the primary focus. The reaction at this point is so slight that the patient is unaware of any trouble until the signs of lymphangitis, lymphadenitis, phlebitis, or a general infection appear. But I wish to emphasize here that in many of these cases there was opportunity to treat the apparently insignificant wound immediately after its infliction, and, as a rule, in the cases which I have observed, the wound was of such a character as to indicate the immediate and thorough disinfection which I have described. For example, wounds of surgeons and pathologists at operation and autopsy; wounds of bacteriologists from broken test-tubes containing virulent cultures; wounds from rusty nails; bites of human beings and animals; ragged wounds in opening cans containing infected material, etc.

It is quite true that in the majority of cases of lymphangitis and

lymphadenitis there is a primary focus. Whether this focus is present and active or not, the treatment for the lymphangitis and lymphadenitis is identical.

The appearance of lymphangitis or adenitis beyond a primary focus is an indication of extension, and should be looked upon as a danger signal. The treatment for the primary focus should be more radical.

**Non-operative Treatment.** For every primary infection there should be some treatment, no matter how insignificant the lesion.

The principles of treatment rest upon the proper conception of the inflammatory process and its adaptability, our present knowledge of immunity, and the practical details of Bier's hyperemia. The locality should be disinfected externally, best with pure carbolic acid followed by alcohol. The protective dressing should be moist and warm—ointment or gauze saturated in warm salt solution. The parts should be kept at rest, and the patient should avoid excessive exercise and exposure to cold. Elimination should be encouraged, alcohol should be absolutely avoided, and the diet guarded and not excessive. The amount of water taken should be increased. For the ordinary primary focus of infection this is often sufficient to accomplish healing without suppuration. It is well, however, to employ other methods of treatment, if only as measures of prevention, that is, prevention in the sense of checking local extension of the process and reducing the chances of general infection. The additional measures consist chiefly of hyperemia. The active hyperemia is best maintained by hot applications, passive hyperemia by the Martin bandage or suction cups. In very small local infections, like a furuncle, or a hang nail, the part can be covered with a small piece of cotton and then everything covered with collodion. The cavity containing the cotton acts as a vacuum and the contracting collodion produces passive hyperemia. This dressing also protects against trauma and puts the part at rest.

These principles of treatment embrace all that can be done conservatively. For the lymphangitis and lymphadenitis above the primary focus, we employ the hot applications—gauze moistened in hot salt solution; the affected part is covered with this. To keep the heat in longer and prevent evaporation, the wet gauze is covered with rubber cloth (the best is dental rubber dam). This active hyperemia from the external application of heat can be comfortably maintained in some cases by soaking the arm or leg, or even the entire body, in a bath of hot salt solution.

It seems to be the consensus of opinion that moist heat, either in the form of steam or wet gauze, or the hot bath, is preferable to dry heat in acute inflammatory processes. Personally, I have had less experience with dry heat, and I am by no means convinced that it may not have its place in the treatment of acute infections.

There is no doubt, however, that hyperemia should be a part of the treatment of the inflammatory process in certain stages, especially the early stages.

The part should be kept at rest and protected from all trauma. For example, massage is contraindicated in lactation mastitis. The patients should not be allowed to walk with an infection of the lower extremity, and in infections of the upper extremity it should at least be carried in a sling.

If hyperemia, protection, and rest are efficacious in the graver degrees of infection, one can easily understand that if they are employed earlier and in less severe cases they undoubtedly will act as measures of prevention of extension of the process.

When the infection has extended from the primary focus, and there is a lymphangitis and lymphadenitis with other signs of general infection, the condition must be considered grave. The patient should be in bed; fresh air is essential, a part of the treatment most frequently neglected; the diet should be liquid, water should be given in excess; alcohol and stimulants are contraindicated.

**Operative Treatment.** The questions to be decided are: When shall a local infection be excised, and how extensive shall this excision be, or when shall the operative measures be limited to incisions? What are the complications of lymphangitis that require incision? When shall the affected lymph gland be dissected out?

No general statement will cover the ground.

If in the treatment of a local infection signs of lymphangitis and lymphadenitis appear, that is an indication that the local treatment is insufficient, and the local focus should be attacked by operation. The object of the operation is to excise the infected tissue if possible, to open and drain concealed pus pockets, and to produce local conditions in the region of the local focus which will aid the tissues in combating the infection.

In discussing the operative treatment of lymphangitis and lymphadenitis, it is necessary, for emphasis, to repeat.

In cryptogenic infections there is no opportunity for the treatment at the primary focus, except within a few minutes after the infliction of the wound. Physicians and nurses should be instructed that if they receive wounds during operations or at autopsies upon infected cases, or inoculations in the laboratory with cultures of pyogenic bacteria, that one or more bandages should be immediately placed above the locality of the wound. If the wound is open, it should be allowed to bleed, blood should be expressed by massage, and the wound should be disinfected. The Esmarch bandage should at first be tight, then gradually loosened, but one Esmarch should be kept on for eight or ten hours, compressing the vein slightly. Active hyperemia should be induced by hot applications, and the patient should remain quiet.



When the wound is not open, but made by the prick of a needle or knife, it should be incised or excised after the Esmarch has been applied. This open wound is then treated as just discussed.

The public are less liable to virulent infections of this kind, but should be instructed, after an accidental wound, to employ temporary constriction, to encourage bleeding, to disinfect with very hot water, to cover the wound with a protective dressing until the physician is summoned.

In the majority of cases of accidental wounds there are no indications for operative intervention until signs of local or general infection develop. There are some exceptions, however.

In civil practice, at least, bullet and other open wounds of joints and tendons should immediately be explored under the proper surgical precautions. No harm can be done if there is no primary infection, and when there is a primary infection by the agent that has produced the wound or the foreign body lodged therein, the chances of a synovitis of a destructive character are very much less if within a few hours after the injury the joint or tendon sheath is washed out in warm salt solution, the foreign bodies removed, temporary drainage with rubber tissue instituted, and hyperemia maintained by a Martin bandage.

In an open wound of bone (compound fracture) from bullet, or not, the indication for immediate operation in the recent state is not as clear as in open wounds of joints. Today it is apparently the consensus of authority to be conservative if the external wound is small, the subcutaneous laceration of the tissues is slight, and the changes of primary infection small. In such cases nothing is done but disinfection of the external wound. This is best accomplished with pure carbolic acid followed by alcohol, as originally employed by Lister, or the more recent iodine disinfection (tincture iodine, 5 per cent., best applied with an atomizer).

In more extensive external wounds and where the chances of primary infection are greater, the wound should be enlarged, the foreign bodies removed, the wound washed out with very hot salt solution, the greatest care employed to preserve the periosteum or fragments, and proper drainage maintained. In this country the routine practice of employing the Martin bandage for passive hyperemia as a preventive measure in accidental wounds is conspicuous by its absence.

In bullet or stab wounds of the abdomen, exploratory operation is always indicated on account of the danger of peritonitis from an injury of the intestines.

Von Reyher, from his experience in the Russo-Japanese Manchurian campaign, concludes that bullet or stab wounds in the region of the buttocks or thighs, on account of the danger of contamination with the intestinal bacteria. Gas bacillus infection should be treated from the onset as infected wounds and opened.

In the majority of cases other wounds, if observed a short time after the accident, are disinfected externally, the blood clot washed out with hot salt solution, ragged tissue cut away with the knife or scissors, and the wound closed with or without drainage. The more vascular the part, the less the necessity for drainage. Contused and lacerated tissue which cannot be excised demand the employment of drainage. The longer the interval between the infliction of the wound and the beginning of treatment with the greater opportunity for secondary infection, the greater the necessity for drainage.

Experience has shown that this knowledge of the proper treatment of recent wounds reduces the number of primary infections with the complication of general infection.

**PRIMARY FOCUS.** There is no simpler or more efficacious method of treatment than the prompt excision of the primary focus. For this reason, if operation is indicated at all, this should be the operation of choice, when the focus can be excised locally without danger to important tissues or organs, and its excision will not produce a deforming scar.

It seems to be the consensus of opinion that in a local anthrax infection any operative measures are contraindicated because of the danger of disseminating the anthrax bacillus. I have not had sufficient experience to either confirm or contradict this statement.

*Operation on the Local Focus.* The excision of the local focus may become an operation of necessity. In the first place, the local infection may be comparatively insignificant and there may as yet be no signs of lymphangitis or lymphadenitis, or other symptoms of generalization, but on examination of the patient there is found in the urine signs of nephritis, or sugar, the blood pressure may be high, with other symptoms of arteriosclerosis, the patient may give a history of chronic alcoholism, or show symptoms of delirium tremens. In these patients the resistance to any infectious process is always low, and for this reason local infections which in the healthy individual would give little or no concern, become, in such handicapped patients, relatively malignant.

Experience has shown that small infections from cutting a corn, about nails, even a simple hangnail, small cuts and pricks, simple furuncle or carbuncle in such patients, especially the diabetic and arteriosclerotic nephritic, become locally more extensive, and that the danger of general infection is so much greater, that a prompt local excision if possible should be done.

In the second place, operative intervention upon the local infection may be looked upon as imperative on account of signs of general infection in the healthy individual. If these signs are indicative in the normal individual, they are much more so in the handicapped patient.

What are the general signs which indicate that a primary focus is beginning to become a general infection? They are, extending erythema of the derma about the focus, or the increasing edema, red lines of

lymphangitis, pain on motion of muscle (perhaps due to lymphangitis of deeper vessels), painful and swollen lymphatic glands above the infection, thrombosis of veins (this is rare, and is indicative of a very grave infection in the majority of cases). Other general symptoms are fever, leukocytosis, chills, headache, malaise, nausea, and vomiting. The most reliable of all these is a leukocytosis.

The appearance of albumin or casts in the urine, of delirium, or of a low leukocyte count denotes a low resistance, and must be looked upon as a grave symptom.

The clinical picture of grave general infection secondary to a primary focus at the portal of entrance must be considered an unjustifiable occurrence. If primary wounds are properly treated, and primary infections intelligently observed, the maximum of symptoms of the general infection with its dangers should not be permitted to supervene.

The signs of inflammation about the local focus are, of themselves, no indication for operation. There may be intense redness, swelling, edema, pain, and local heat. These of themselves may be looked upon as good evidence of local reaction which is combating the infection. With such symptoms we may expect resolution or abscess formation, and it should take place quickly. The signs of abscess formation may be looked upon, with few exceptions, as indicating incision with evacuation of the pus. In some instances a free incision will hasten resolution before pus accumulation takes place. In lactation mastitis one employs Bier's hyperemia with the vacuum cup until the signs of fluctuation appear, when an incision is made; but when the patient's general condition is indicative of general infection, the area of mastitis should be immediately incised without waiting for signs of fluctuation. In an ischiorectal infection incision in the early stage of cellulitis before the abscess has formed saves the patient many hours of suffering, reduces the destruction of tissue, and shortens the period of disability.

There are other indications for operation on the local focus: Whenever the local focus is extending toward tissues or organs, the involvement of which will add to the danger of general infection, or to loss of function. An infection in the neighborhood of a joint or tendon sheath should be more promptly incised for the protection of the joint or tendon sheath than one situated on the thigh at a great distance from a joint or tendon.

The indications, therefore, for the excision of the primary focus are many, the most important of which are, of course, the prevention of general infection, or the local infiltration of important tissues or organs.

In operations upon the primary focus, the surgeon should attempt not only to act promptly the moment the indications for operation arise, but when the operation is performed it should be so carefully planned that it will be sufficient at least for the primary focus, and that



in operating upon the local area uninvolved neighboring important tissues are not injured. For example, in excising a focus on the finger, the utmost care should be employed not to open an uninfected tendon sheath or joint.

The operation, therefore, should be done if possible under an Esmarch. This prevents dissemination during manipulation, makes a wound free of blood in which the tissues can be carefully inspected as they are excised, and encourages oozing from the wound after the Esmarch has been removed.

It is important to remember that general anesthesia, especially chloroform, reduces the individual's resistance to general infection. Opie and others have shown that chloroform increases the action of various toxic agents, whether chemical or bacterial. Nitrous oxide, therefore, should be the anesthetic of choice, when the operation cannot be performed under local anesthesia. For local anesthesia ethyl chloride is very useful in certain small infections. The more recent methods of local intravenous anesthesia (Bier) may find a special field here.

When symptoms of general infection are present, and especially in individuals with sugar and albuminuria, the danger of reducing the resistance by general narcosis becomes greater.

I am confident that in the more grave infections many fatal results are due to prolonged narcosis and lack of care in checking hemorrhage. The anemia from such hemorrhage is an additional and very decided factor in reducing the general resistance of the patient.

I call attention to this here, before discussing the indications for the operative intervention of the first general complication of a local infection.

In the first place, if we are given the opportunity we should plan our local treatment or operation in such a way as to obviate the necessity for any further operative treatment. When we see the patient with not only the local infection, but signs of lymphangitis and lymphadenitis, all three conditions should be borne in mind at the operative intervention. The point that I wish to emphasize again and again is the danger of repeated operations in infections, and this danger increases with the degree of the infection and with the handicap of the individual.

**Lymphangitis.** The red lines extending above the primary focus are the first signs of lymphangitis, and, as we have stated before, should be looked upon as an indication that the treatment of the primary focus is insufficient.

In neglected cases, this lymphangitis may extend to the surrounding cellular tissue. Cellulitis, therefore, may be looked upon as a local extension from the primary focus. The indications for the operative intervention here are identically the same as for the primary focus. Individuals who have sufficient local resistance to allow the develop-

ment of a cellulitis without much general infection can be looked upon as good risks, and the indications for operation are quite frequently governed more by local conditions than by general.

For example, in small infected wounds of the fingers without involvement of tendon sheaths or extensive cellulitis, we more often see grave general infections, even death, and suppurating glands in the axilla, than in the more extensive infections of the hand with cellulitis and the involvement of tendon sheaths. In one, the problem is to save life from general infection by promptness in the treatment of the wound or the infected focus the moment it appears; in the other condition, the employment of measures to save function.

**Lymphadenitis.** It seems to be surgical experience that enlarged and swollen glands above the primary focus may be looked upon as a sign that the individual has considerable resistance. The lymph glands are not necessarily filters, but they are the first tissues beyond the local focus to meet the invaders. Reaction here, to a certain extent, is a fair sign of reaction elsewhere. For example, of two patients with infected fingers and signs of general infection, the one with enlarged and tender axillary glands is the more resistant, and the chances of his recovery are distinctly better after treatment of the primary focus and without any intervention on the enlarged glands.

I am unable, from my own experience, and from the literature, to establish any indication for operative intervention upon adjacent lymph glands in cases of secondary involvement with signs of general infection.

The reaction of the lymph glands is simply one of the signs of a general infection and may be looked upon as an indication that the treatment of the primary focus is not yet sufficient.

It is quite true that the reaction of the lymphoid tissue may not subside after the proper treatment of the primary focus, that is, the lymphadenitis continues. It now must be looked upon as a secondary focus with operative indications of its own. In the majority of cases it is safer to allow the lymphadenitis to go on to abscess formation, and then incise and drain rather than perform an extensive dissection of all the lymph glands in the early stage of the lymphadenitis.

In the lymphadenitis of the glands of the neck as complications of diphtheria, tonsillitis, infected teeth, the infected throats of the infectious diseases of children, etc., experience has shown that complete dissection of the involved glands would be dangerous during the height of the infection, and, even if it were not dangerous, the resultant scar would be greater than after the incision of an abscess. In involvement of the glands of the groin in venereal infections, experience has shown that complete excision of the glands in one or both groins is not necessary to save life from general infection, it rarely shortens the period of disability, and there is an additional contraindication to complete

extirpation elephantiasis of the leg and scrotum. The scar from the operation on the groin is not a contraindication as it is in the neck.

It seems to me, therefore, that we can be quite emphatic that our experience up to the present time favors conservative measures in lymphadenitis.

To completely extirpate the lymph glands in a patient acutely ill with general infection would not remove all of the sources of the general infection, because the lymph glands are only part of the tissues involved. The operation would depress on account of the long anesthesia. We have, therefore, no theoretical grounds for this intervention.

In my own experience I have operated on a few occasions for the removal of the lymph glands during the acute stage, but I have never been able to convince myself that the recovery of these patients was influenced by this radical procedure. In fact, I think it may have been retarded by the wound complications following the operation.

When the primary infection has been taken care of and the lymphadenitis does not subside, the question to decide is, Shall the glands be removed, or shall we wait for abscess formation?

In the lymphadenitis of the groin secondary to gonorrheal or chancroidal infection, the consensus of authorities today favors delay until suppuration has, at least, begun. The operation consists in incision and a rather blunt dissection of the necrotic glands, but not a complete dissection of the entire lymphatic tissue. After this more conservative operation, elephantiasis of the scrotum and leg has not been observed.

In the axilla, the swelling of the arm following the complete dissection of the glands is so slight that there is no contraindication to make a complete dissection before the stage of abscess formation.

In the neck, in the infection of the glands from the diseases already noted, it seems better to wait for abscess formation. In a few cases there is neither resolution nor abscess formation, but the glands remain chronically enlarged, with some signs of general infection; that is, we have a secondary metastatic focus acting in a way similar to a primary focus.

### SPECIFIC INFECTIONS

**Tetanus.** The importance of the preventive treatment of tetanus has been emphasized in these pages from the beginning. Every patient who suffers from an accidental wound in which there is any soiling from earth should be given immediately an injection of the antitoxin. Some surgeons and many clinics go farther and give the preventive injection to every individual suffering with an accidental wound. In spite of the immense literature in both lay and medical journals, this advice has been overlooked. Even in military surgery preventive inoculation with the antitoxin is not the rule. There were over 500



deaths from tetanus after the battle of Mundell (von Reyher). In none of these cases had a prophylactic treatment with antitoxin been given. In glancing over the literature of tetanus today, most of the cases reported had wounds of a character which should have suggested this preventive treatment. It seems to me that the preventive treatment of tetanus is settled and needs no further discussion. Among hospital surgeons it has been adopted in a large number of cases as a routine measure, but the general practitioner seems neglectful.

When the symptoms of tetanus have developed, the chances of a cure apparently depend more upon the interval of time between the accidental wound and the symptoms than upon treatment. Anders<sup>1</sup> illustrates this in a table of 803 cases.

In the previous numbers of *PROGRESSIVE MEDICINE* I have shown, in discussing the treatment, that there is nothing specific. The treatment is a very mixed one and consists of disinfection of the wound, which should be repeated daily; excision of the granulation tissue if local disinfection does not reach the depth; the continuous employment of the antitoxin; the administration of morphine and chloral hydrate; the giving of large quantities of water, preferably by rectal enemata combined with nutritive enemata. The patient should be in a dark room, rest should be enforced, and every precaution employed to avoid mental or physical disturbance. Then I have discussed the intraspinal injections of magnesium sulphate suggested by Meltzer and Auer. Blake<sup>2</sup> and Miller<sup>3</sup> have gone into the details of this treatment. I have had no experience with this treatment except I have observed one of the cases reported by Miller. McGlannan<sup>4</sup> advises that one should employ 1 c.c. of a 25 per cent. solution of magnesium sulphate for each 25 pounds of body weight. The injection is made in the usual way as for lumbar anesthesia, first withdrawing a corresponding amount of cerebrospinal fluid. It may be necessary to anesthetize the patient if the injection excites convulsions. The injection should be repeated if the convulsions return. In Blake's case convulsions were controlled from twenty-nine to thirty-seven hours after each injection.

Meltzer and Auer's original communication appeared in the *American Journal of Physiology*, October, 1905, and *Medical Record*, December 16, 1905. It is my opinion that this treatment should only be employed by surgeons and physicians who have had experience with lumbar puncture and intraspinal injections.

*Bacelli's Carbolic Acid Treatment.* The most important contributions to tetanus in recent literature are reports on the method intro-

<sup>1</sup> *Journal of the American Medical Association*, July 29, 1905.

<sup>2</sup> *Surgery, Gynecology, and Obstetrics*, 1906, vol. ii, p. 541.

<sup>3</sup> *American Journal of the Medical Sciences*, December, 1908.

<sup>4</sup> *Practical Treatment*, Musser & Kelly, 1911, vol. ii, p. 603.

duced by Guido Bacelli,<sup>1</sup> in 1888. F. Imperiali<sup>2</sup> presents a monograph with a study of 120 cases. It is his opinion, that after the symptoms of tetanus develop, the carbolic acid treatment offers greater hope than any other method. In this contribution he practically gives the advice which I have already outlined, but, in addition, emphasizes the additional therapeutic agent—carbolic acid. It is his opinion that it offers more hope than Meltzer's intraneural magnesium sulphate salts. According to Frazier,<sup>3</sup> this carbolic acid treatment consists of a subcutaneous injection of a 1 per cent. solution of carbolic acid at frequent short intervals, until 80 grains or 5 grams are given to an adult in twenty-four hours.

Bellusi,<sup>4</sup> however, in his successful case used a smaller dose, giving only 40 cg. per day, and in all a total amount of 3 grams.

P. A. Lop<sup>5</sup> employed but 10 c.c. of Bacelli's solution. These Italian authorities, in addition to the repeated daily doses of carbolic acid, thoroughly disinfect the wound again and again, give repeated doses of antitoxin up to the tenth day (*after this there is danger of anaphylaxis*), employ morphine and chloral hydrate, and, in severe convulsions, chloroform.

The most recent communication from a Russian clinic is by Magula,<sup>6</sup> who does not mention carbolic acid. He has employed chiefly the antitoxin, with the conclusion that the treatment of tetanus after it has developed is most unsatisfactory.

When tetanus does develop and we should look upon a case in the majority of instances as due to neglect in the preventive treatment, every means should be employed. The earlier the symptoms appear after the probable infection, the more energetic should be the treatment. It is even justifiable to run some risks, but when the symptoms of tetanus develop after the seventh or tenth day the prognosis for recovery without treatment is so good that these methods of treatment should not be pushed beyond safe limits. In the hands of one not experienced with lumbar puncture, it is my opinion that Bacelli's carbolic acid treatment should be employed. It seems devoid of danger if one keeps within the limits of the dose noted here.

## TUMORS

**Epithelial Tumors.** *Cystic.* While my records show 684 examples of solid epithelial tumors,<sup>7</sup> there are about 128 epithelial cysts. Among

<sup>1</sup> Il Policlinico, November 15, 1895.

<sup>2</sup> Centralbl. f. Chir., 1911, vol. xxxviii, p. 285.

<sup>3</sup> Keen's Surgery, 1906, vol. i, p. 495.

<sup>4</sup> Il Policlinico, vol. xvii, p. 50.

<sup>5</sup> Gaz. des Hôpitaux, 1910, No. 107.

<sup>6</sup> Centralbl. f. Chir., 1911, vol. xxxviii, p. 237.

<sup>7</sup> Wisconsin Medical Journal, August, 1910, vol. ix, Table I.

these, 32 were situated in the neck and apparently originated in the residues of the embryonic branchial cleft. At the same time I have observed 23 examples of carcinoma of the neck of the same origin. This demonstrates the frequency with which these embryonic epithelial residues produce the malignant tumor. Among 9 epithelial cysts in the region of the tongue (ranula) there are no examples of the malignant tumor. If we employ the term dermoid to distinguish the other forms of epithelial cysts, I have observed 87 cases, of which 5 were malignant. Dermoids are rarely observed on the extremities. Among these 87 cases, only 15 were situated on the extremities, and of these only one was malignant.

These dermoids appear as subepidermal and subcutaneous nodules. They arise from misplaced ectoderm, or they may be of traumatic origin—pieces of epidermis carried in by trauma. These epithelial cysts may also arise secondary to chronic inflammation of the sweat glands, hair follicles, or sebaceous glands. On the extremities, the congenital dermoid is less frequent than the acquired. There is no doubt that these little, apparently innocent, cystic tumors may be precancerous lesions, and should be excised. The tumor should at once be examined, and if there is any evidence of a malignant change, a larger zone of skin and tissue should immediately be removed.

*Solid.* In PROGRESSIVE MEDICINE for December 1904, 1907, and 1909 I have discussed this subject, giving the classification with illustrations of the different types. Since then my attention has been chiefly concerned with the precancerous lesions, and this year I prepared a paper for the Surgical Sections of the American Medical Association on a study of 1000 cases of cancer of the skin and mucous membrane, with especial reference to the precancerous lesions, and a second study for the American Surgical Association on cancer of the tongue. Here also the relation of the malignant tumor to some previous benign lesion can clearly be demonstrated. From this study we can conclude that in the very large majority of cases of cancer of the skin and mucous membrane there is, in the beginning, a local defect or lesion in the skin, mucous membrane, or subepidermal or submucous tissue, which is distinctly benign. If the area is removed in this stage—and it can be removed by a small local operation—the probability of a cancer developing in this lesion is *nil*.

*There is no doubt that this attitude toward cancer in general will reduce to a very large degree the number of deaths from cancer and minimize the number of mutilating operations. It is my opinion that the chief hope in the treatment of cancer is in this direction.*

A study of cancer of the cheek illustrates the precancerous lesions perhaps better than any other locality. I have found here 6 cases of subepidermal nodules, 8 cases of benign warts, and 5 cases of malignant warts. In all of these cases, after the removal of the local growth,



there has been no recurrence. There are 43 examples of basal-cell epithelioma which have come under observation either as ulcers or fungi. When these cases are studied critically, we find in practically every case the history of previous epidermal or subepidermal nodule, or a pimple, or a non-pigmented mole, which has remained latent for years. Then, coincident with local growth there has been ulceration, with the formation of an ulcer or a fungus which has slowly extended. In this stage of the basal-cell epithelial tumor cures have always been accomplished, provided the local growth had not extended too far. But many of these patients had come under observation in the inoperable stage, and a large number of the others were cured, but by mutilating operations. In every one of these patients the lesion could have been removed when it was small. In this stage it gives no discomfort, however, and even on the face it is not much of a defect, and, as both physicians and the public have not been instructed as to the dangerous possibilities, neither comes for treatment in the most favorable period.

There have been 13 examples of the cubocellular (transitional cell) type and 38 of the spinocellular (squamous-cell) epithelioma. In these groups also we find a precancerous lesion—a subepidermal nodule, a wart, an unhealed wound, various types of keratosis, syphilitic, and tubercular ulcers. As a rule, the latent period is shorter, and when the primary lesion begins to grow locally, the growth is more rapid than in the basal-cell tumor. In addition, the cubocellular and spinocellular tumors tend to infiltrate more extensively locally than the basocellular and to involve the neighboring lymphatic glands. For this reason the number of inoperable cases is larger and the number of cures, even after mutilating operations, smaller.

**Epithelial Tumors of the Upper Extremity.** Among 49 cases there are no examples of subepidermal nodules. Fortunately, in 20 cases the local lesion was a benign wart. In 7 cases, the wart had become distinctly malignant. All of these 27 patients have remained well since removal. This relatively large number of benign, or early malignant, warts has apparently come under my observation as the result of my instructions to the third and fourth year medical students. The basal-cell tumor rarely appears on the skin of the extremities. I have but three examples. In these, the precancerous lesions were a subepidermal nodule, an ulcer secondary to a wound, and an ulcer secondary to keratosis. We find no examples of the cubocellular tumor on the upper extremity.

Among the 18 cases of cancer of the spinal-cell type which came under observation in the stage of ulcer or fungus, in every one there was a precancerous lesion. This lesion in the majority of cases was an unhealed ulcer of years' duration secondary to a burn or a wound. In a number of cases there had been a wart or a papule. In none did I find a history of a subepidermal nodule. In all of these cases the precancerous lesion could have been removed before the malignant tumor had developed.

Fig. 4 is a good example of a benign wart of six years' duration (P. No. 9401). The patient was aged thirty-four years; the wart was situated on the arm. Fig. 5 (P. No. 6374) is an example of a malignant wart. The patient was aged seventy years; had had a small defect, probably a minute wart, on the thenar surface of the thumb; he had observed ulceration six weeks; there was no recurrence for five years after its excision.

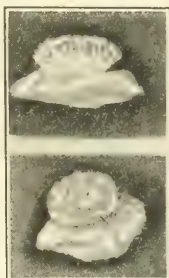


FIG. 4.—Benign spinocellular epithelioma.

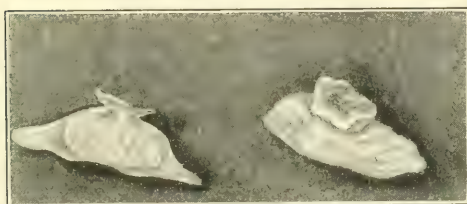


FIG. 5.—Epithelial wart.

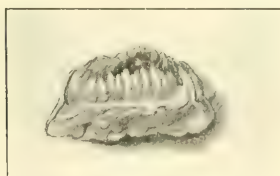


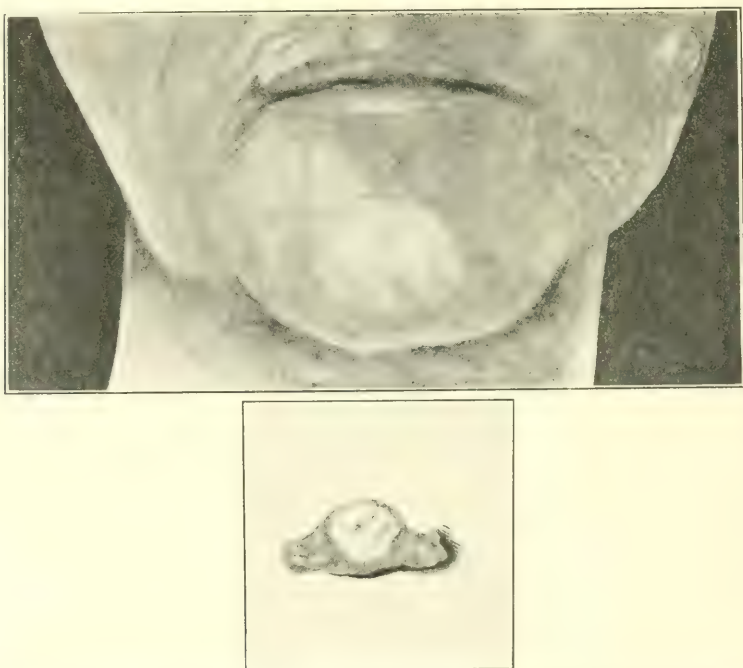
FIG. 6.—Malignant spinocellular epithelioma.

Fig. 6 (P. No. 10,272) is a wart of two months' duration, situated on the forearm of a woman, aged sixty-four years, and microscopically showed beginning malignant change. Experience has shown that there is no way to estimate whether an apparently benign wart will become malignant, or, if so, how soon. The best rule is to excise the wart.

**Epithelial Tumors of the Lower Extremity.** The study of these cases confirms the conclusion already reached in the investigation of epithelial tumors of the upper extremity. I find 13 benign warts, 3 malignant warts, 5 basal-cell tumors, 3 cubocellular tumors, and 17 spinocellular cancers. Here, for the first time, I have had the opportunity to excise ulcers before they had become malignant.

In the basal-cell, cubocellular, and spinocellular cancers, in every case there has been a precancerous lesion similar to the observation of the same tumor in the upper extremity. Examples of unhealed ulcers from burns in wounds predominate. We also find warts, subepidermal nodules, areas of eczema, bedsores, pimples; in one case a sinus from chronic osteomyelitis. The subepidermal nodule in this group all developed into basal-cell tumors (3 out of 5). Of the remaining basal-cell tumors, one developed in an ulcer secondary to a burn, the other secondary to a wound.

These observations demonstrate how important it is to remove the apparently innocent subepidermal nodule and wart; to cause healing of ulcers no matter what their origin; to eradicate in some way all form of epidermal overgrowths, as in eczema and the various types of keratosis. These lesions are neglected, because, as a rule, they give no discomfort and because they are chronic. As a matter of fact, in medicine chronic lesions seldom receive the same attention by patient and physician as the acute.



FIGS. 7 and 8.—Malignant spinocellular epithelioma. Subepidermal nodule, skin of face.

Figs. 7 and 8 (P. No. 9465) is a good example of the clinical and gross appearance of a subepidermal nodule which I removed from a woman, aged seventy-two years, after it had been present only two weeks. Yet, microscopically, it was a malignant spinocellular tumor.



Fig. 9 (8739) is a good example of the very common type of wart which may form on the skin of the foot or hand. This one, microscopically, is still benign.

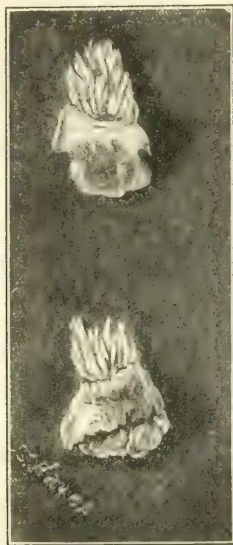


FIG. 9.—Benign spinocellular epithelioma. Dorsum of foot.

**Benign Pigmented Moles.** The relation of this epidermal lesion to the malignant has been discussed before in *PROGRESSIVE MEDICINE*. They are comparatively infrequent on the skin of the upper and lower extremity. They can be distinguished only by their pigmentation. They appear as flat pigmented areas in the epidermis, or as projecting growths, and when they project they are either smooth or warty, with or without hair. It is my opinion that the elevated pigmented mole, especially if it is in a position subjected to frequent trauma, should be removed. It is impossible to foretell whether a given mole will become malignant and when. It is also my opinion, based upon experience, that these moles should be removed by excision with a good margin of uninvolved tissue. Any other treatment is apt to leave residues of the embryonic cells, and I have had examples of recurrence after such operations, and the recurrent tumor has usually been malignant. Personally, I have never treated a benign mole, except by excision, and I have never observed a recurrence. Most pigmented moles are observed at birth. Should they be observed for the first time later in life, immediate excision is even more imperative.

**Malignant Pigmented Moles.** Since my last report in *PROGRESSIVE MEDICINE* the number of cases has increased, but up to the present time there is not a single definite cure, although one patient is apparently well five years after the removal of his malignant mole. During this

time two metastatic nodules have been excised. The tissues from this case were sent to me by Dr. Wainwright, of Scranton, Pa.

Among 62 malignant moles, 39 developed in the congenital tumor; in 23 cases the patients were unaware of any congenital defect, but later in life a tumor resembling a congenital mole appeared. As this proportion between the congenital and acquired tumor is so much larger in this malignant group than in the benign, I have drawn the conclusion that there is a greater tendency in a pigmented mole, which appears for the first time later in life, to become malignant.

### BENIGN CONNECTIVE-TISSUE TUMORS

These we have discussed pretty thoroughly in previous contributions to *PROGRESSIVE MEDICINE*,<sup>1</sup> but I wish to call attention to certain features which I did not emphasize in my previous discussions as much as further experience now justifies.

The first point is the relation of the benign connective-tissue tumor to the sarcoma. That is, how frequently are these tumors in a sense precancerous? Secondly, what changes may take place in the benign lesion and simulate in the clinical or in the gross or microscopic appearance, a sarcomatous change, and which would lead the surgeon to do an unnecessary radical operation on the incorrect diagnosis of a sarcoma?

Experience which has accumulated and further study of the older cases bring out more prominently the fact that many sarcomas develop in tumors which have been present a long time and which, when removed, show, in places, tissue resembling a benign connective-tissue tumor. With this evidence, it seems fair to conclude that the sarcoma has developed in a benign tumor. In addition, there is no doubt that, if the surgeon takes this attitude, and the profession and laity are instructed in regard to this possibility, he will see and remove a relatively larger number of benign tumors and more of the sarcomas in the earlier and operable stage. In regard to the second point, my recent experience and re-study of the older cases show that the benign tumor may clinically, or in gross or microscopic appearance, take on changes which are distinctly benign, but which suggest sarcoma, and which, if not recognized by the surgeon at operation, may lead in some cases to a more extensive removal of a mutilating character, and, when situated on the extremity, may lead to an unnecessary amputation. These two viewpoints I propose to illustrate in the various connective-tissue tumors.

<sup>1</sup> *PROGRESSIVE MEDICINE*, December, 1903, p. 151; 1905, p. 240; 1907, p. 202; 1908, p. 215; 1909, p. 198.

**Hemangioma.** This is the largest group of the benign connective-tissue tumors—at my last report 109 among 384 cases. The hemangiomas are most frequently congenital. The congenital tumor, when it appears in the skin, can be recognized by its color. When it is subcutaneous, its chief clinical feature is its compressibility and change in size. When it is situated on the extremity, it is larger with the limb in a vertical position than in a horizontal. This change in size can be well demonstrated by placing an Esmarch above. The angioma never pulsates, nor does it give to the ear any auscultatory sign. This distinguishes it from the arterial and arteriovenous aneurysm. The hemangioma of the skin and subcutaneous tissue may be acquired. As a rule, in these cases there is the history of an injury. The tumor, therefore, is, in a certain sense, an overgrowth of granulation tissue. The angioma is composed of endothelium-lined blood spaces, held together by cellular connective tissue. The size of the blood space varies, giving rise to the terms capillary and cavernous. The amount and character of the tissue between the blood spaces may also vary. When there is great endothelial proliferation, the angioma may have the appearance of an endothelioma. When the connective tissue between the endothelium-lined spaces is very cellular, the picture may be mistaken for a perithelioma. In angioma of the skin or subcutaneous tissue, whether of the congenital or acquired type, there may be ulceration of the epidermis, generally due to trauma. The angioma becomes covered with vascular granulation tissue, and the tumor itself reacts and becomes much more cellular. Quite frequently I have had tissue of this type sent to the laboratory with the diagnosis of sarcoma. In my experience, in hemangioma, I have always been able to find areas which are characteristic of the benign tumor. These areas are bright or dark red, spongy or compressible, and upon pressure, blood can be expressed. Such areas I have never found in sarcoma.

Figs. 10 (7531) and 11 are photomicrographs of a small angioma of the skin of the hand which had ulcerated. It was thought to be sarcoma.

Hemangiomas are relatively infrequent on the extremities, and here the acquired type is most common. I have observed 8 cases on the lower extremity and 10 cases on the upper.

The thigh is the most frequent site on the lower extremity, and the hand and fingers on the upper.

**Fibro-angioma.** This term has been employed to distinguish that form of angioma in which there is a very great hypertrophy of the connective tissue between the endothelium-lined blood spaces. I have previously spoken of this group, with illustrations, and have drawn attention to how frequently this tumor has been mistaken for sarcoma. In *PROGRESSIVE MEDICINE* for December, 1907, the illustration (Fig. 20) shows beautifully the red spongy areas of distinctly angiomatous tissue



appearing as islands in the otherwise cellular, fibrous tumor, which might be mistaken for sarcoma. I have never seen such areas in sarcoma.

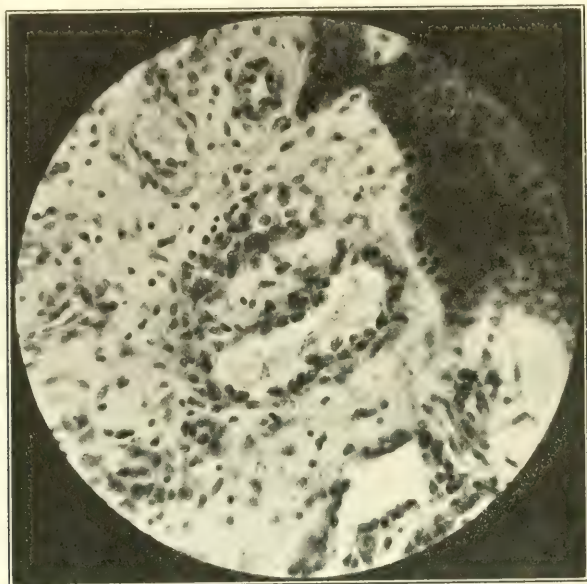


FIG. 10.—Capillary hemangioma of back of hand.



FIG. 11.—Ulceration hemangioma of back of hand.

Up to the present time I have 10 examples of such fibro-angiomas. In at least 3, if the character of the tumor had not been recognized, an unnecessary amputation would have been performed.

**Intermuscular Angioma.** There is very little to add to my previous presentation.<sup>1</sup> At that time I reviewed the monograph of John Staige Davis. Since then one interesting case has come under my observation. This patient first developed a club-foot (*talipes equinus*) and then a flexion contraction at the knee. There was no apparent cause for these contractions. The surgeon under whose care the patient first came performed a tenotomy on the tendo Achillis and then attempted to overcome the contraction at the knee-joint by exposing the muscles and tendons in the popliteal space, but he encountered so much hemorrhage that he desisted. Then he made a second attempt and encountered the same unusually vascular tissue. In checking the profuse bleeding, the popliteal artery, or the vein, or both, must have been clamped and ligated, because after this operation there was gangrene of the foot which necessitated an amputation of the leg in the lower third. When the patient came under my care two or three years later, he sought help because the limb was useless on account of the contraction of the stump at the knee which had increased from the scar tissue in the popliteal space, and he could not wear an artificial limb. The leg below the knee was atrophied, but the thigh, in spite of little muscular exercise, was twice as large as the opposite side. In addition, the saphenous vein and its branches were hugely dilated and presented a most aggravated picture of varicose veins. The thigh, especially in the area of the adductors, was compressible, and this area, when the limb was elevated, became smaller, and when the limb was lowered the swelling returned. There was no pulsation and no sound on auscultation. In reviewing the history with the patient, I found that his first symptoms before the contraction of the foot and leg were swelling of the calf and of the region of the adductor muscles. The patient himself had observed this swelling to be greater when he stood and to be less in the morning before he got out of bed. At the time of his first operation, no measurements were made to bring out the difference in size, no note on compressibility; in fact, there was no thought of this possible etiological factor, which is one of the secondary phenomena of intermuscular angioma. To give this patient a stump which would carry an artificial limb, I amputated above the knee-joint, and found the previously diagnosticated intermuscular angioma. In the thigh it was entirely confined to the adductor magnus muscle which had to be removed up to the attachment of the pelvis. This muscle was replaced by red, vascular, compressible tissue resembling a fine sponge; from the meshwork blood could be expressed. In the popliteal space there was a mass of scar tissue which extended down to the tip of the stump of the leg, but in this scar tissue there still remained angiomatous tissue. This patient, therefore, must have had an intermuscular angioma

<sup>1</sup> PROGRESSIVE MEDICINE, December 1908, p. 177.

involving the gastrocnemius as well as the adductor magnus. In my group of 6 cases, and in Davis' cases collected from the literature, there is not another example of such an extensive involvement. This last observation of mine illustrates the importance of looking for an intermuscular angioma as the cause of contractions of the foot and leg.

**Granulation-tissue Tumors.** Among the hemangiomas in 6 cases the little tumor, which appeared as an ulcerating, fungous area, was so cellular and resembled so closely ordinary granulation tissue that it appears more instructive to place them in a group by themselves. The age of onset varied from nine to twenty-five years; the duration of the lesion, two weeks to three months; the position of the lesion was three times on the palm of the hand, once on the finger, once at the side of the toenail, and once in the skin of the axilla. In every instance there had been a trauma, and in the position of the minute wound a small fungating vascular tumor. Fig. 8 (6701) represents one of these tumors situated on the skin of the axilla. It was sent to the laboratory with the diagnosis of sarcoma of the skin.

Syphilitic infection through wounds on the skin, especially at the end of the fingers, may appear not as primary chancres usually appear, but as exuberant granulation-tissue tumors. The granulation tissue will recur again and again after excision and curetting until the physician may think he is dealing with a sarcoma. The lesion will immediately heal up after specific treatment. I have seen 2 such cases in physicians; one had about decided to have his finger amputated on the diagnosis of sarcoma. Today a Wassermann test would be an important aid in diagnosis. These 2 cases of mine were observed before the Wassermann reaction was discovered. It might be remarked here that, in all doubtful lesions, a Wassermann blood test should be made. As I will discuss later, under periosteal sarcoma, syphilitic periostitis is frequently mistaken for a periosteal sarcoma.

**Lymphangioma.** In my experience, the lymphangioma is much less frequent than the hemauglioma, and, as a rule, appears as a diffuse, easily recognized condition, known as elephantiasis. Among my 31 cases, 21 have been of this type which has been discussed. But the lymphangioma may occur as a smaller circumscribed tumor differing from the hemangioma only in the absence of blood. I have observed 10 such cases. The majority are found to be situated on the lip, tongue, or scalp. I have seen 2 cases on the thigh. One has been previously described.<sup>1</sup> The second, more recent, case was a tumor of fifteen years' duration in a colored man, aged forty-seven years. It appeared as a subepidermal nodule in the skin of the thigh near the trochanter, and had reached the size of 3 cm. It was distinctly encapsulated, and had osseous, calcified, and fibrous areas, but microscopically areas of

<sup>1</sup> PROGRESSIVE MEDICINE, December 1903, p. 172; 1905, p. 249; 1908, p. 214; Fig. 23, and Plate II.



angioma still remained. In some places, the endothelium-lined spaces were so plugged with endothelial cells that it might be called an endothelioma.

**Fibroma.** There are two large groups—the fibroma which develops in the subepidermal or subcutaneous tissue without the history of a scar, and the cicatricial fibroma, or *keloid*. These fibromas are next in frequency to angiomas—about 100 cases as compared with 141 hemangiomas and lymphangiomas. Sarcoma seems to have a greater tendency to develop in fibroma than in angioma, and that in the true fibroma and not in the cicatricial keloid. Fibromas of the tendon sheaths and of the abdominal wall are better studied and grouped by themselves.

**True Fibroma.** The majority of these cases were subepidermal or subcutaneous tumors easily seen and felt. They are very common on the extremities. Ulceration of the epidermis is rarely seen, except when sarcomatous change has taken place. These nodules should always be excised. I have previously discussed and illustrated examples of this type. As a rule, these tumors do not grow to a large size. Most frequently the tumor is encapsulated, but it may be diffuse. The tumor is hard, often painful.

**Fibroma of Tendon Sheaths.** This tumor has also been previously discussed and illustrated. As a rule, it is a single tumor near the tendon sheath, and cannot always be distinguished from ganglion. Among 20 cases, 2 were distinctly sarcoma, but in both of these cases there was long present a small encapsulated nodule. The neglect in the removal of this small nodule led in one instance to the loss of a finger, and in the other to amputation of the arm, because the tumor was situated on the tendon sheath of the flexor carpi ulnaris.

**Fibroma of the Abdominal Wall.** As this lesion does not belong to surgery of the extremity, its discussion is not in place here, but I wish to call attention to the fact that this group of fibromas illustrates the second point I desire to emphasize—that benign tumors may, clinically, and in the gross and microscopic appearance, resemble a malignant tumor. These fibromas of the abdominal wall, or desmoid tumors, often infiltrate, recur after removal, and, histologically, are very cellular, difficult to distinguish from the fibrospindle-celled sarcoma.

**Cicatricial Keloid.** The most interesting feature of this group of tumors, of which I have studied more than 42 cases, is the apparent absence of any tendency to sarcomatous change. The keloid often recurs if removed in an early stage; microscopically it is very cellular; left alone it often has a tendency to cease growing and then to partially or completely disappear. The best results are obtained when the tumor is removed after it has ceased to grow. In some cases, the large size of the keloid growth necessitates its removal in an earlier stage, and one should then expect some recurrence.

**Fibromyxoma.** These tumors, in my investigation of 33 cases, have always arisen from nerves or their sheaths. They appear either as a single tumor or as multiple tumors, or on the ends of divided nerves after amputation. Undoubtedly these tumors are part of some general disease, and the term of von Recklinghausen's disease is better and simpler than any of the many other terms employed. The literature on this disease is very large, and I have previously given a critical discussion. I simply wish to emphasize here the tendency of this tumor, whether single or multiple, to become malignant, and I am inclined to the view that it is safer to remove one or more of these tumors if they show any tendency to grow. They are very common in the axilla, groin, and popliteal space. They may occur anywhere on the extremities along the nerve distributions.

**Lipoma.** This tumor may be single or multiple; it is a little more frequent than the fibroma, has a wide distribution, very frequently occurs on the extremities, and cannot always be recognized clinically, but at the exploratory incision one should have no difficulty in differentiating it from any other tumor. I have never observed a lipoma to become malignant. One should be careful, however, not to make a clinical diagnosis of lipoma, especially if this diagnosis would lead the surgeon to advise against operation. The lobulation and compressibility of a lipoma are not characteristic of the tumor. The same is present in myxomas and in some sarcomas. The intra-osseous lipoma and the lipoma of the joints are of especial interest and have been previously discussed here.

**Benign Connective-tissue Cysts.** These cysts (30 cases) are much less frequent than the epithelial cysts (128 cases). The most common is the lymph cyst of the neck (15 cases). The lymph cysts of the thigh, the ganglion of the tendon sheath most frequent on the hand, the foreign body, and the blood cyst usually occur on the extremities, and I have previously considered these tumors. As sarcoma may now and then appear as a blood cyst, this possibility must always be borne in mind, and there should be an immediate microscopic study of the wall of every apparently innocent blood cyst removed. In my experience, the absence of blood excludes sarcoma. The ganglion is never hemorrhagic and apparently has no tendency to become malignant, while malignant endothelial tumors may develop in the lymph cyst. In my experience, the cyst is then hemorrhagic.

## SARCOMA

Among 45 cases there is the distinct history of a precancerous lesion in 32. This demonstrates that in the majority the precancerous lesion could have been eradicated. For example, the tumors developed in

congenital nevi (6 cases), in scars (19 cases), in fibroma (7 cases). The probability of a cure in sarcoma of the skin is about the same as in sarcoma elsewhere. The angiosarcomas, whether perithelial or endothelial, are relatively malignant. Among 14 cases, 6 developing in nevi, there has been but one cure. This case I have previously reported and illustrated.<sup>1</sup> This patient is still living free from recurrence three and one-half years after operation. Among 26 sarcomas developing in fibromas or scars, 20 have remained well. The tumors in all the cured cases were of the fibrospindle-celled type. This experience demonstrates that the first appearance of any growth in a nevus should indicate its radical removal. Fibromas should be removed. Tumors, not of the keloid type, but developing in scars should be widely excised. The appearance of a subepidermal nodule should always be looked upon as suspicious and the growth removed. In this group there has been neglect not only in the proper attitude toward the precancerous lesion, but even after the development of the malignant tumor time has been lost before operation. Multiple primary sarcomas of the derma are rare (2 cases). Recent literature and my own experience add nothing to what has been previously said on the subject of mycosis fungoides in *PROGRESSIVE MEDICINE*.

**Sarcoma of the Soft Parts.** As these are subcutaneous tumors and, as a rule, more deeply situated, it is difficult in many cases to tell from the history whether there has been a previous tumor or some inflammatory lesion which has acted in the sense of a precancerous lesion. A number of these cases, however, give a history of a quiescent subcutaneous nodule of months' or years' duration before growth is observed. In all, even after the evident local growth, time was lost.

The following table of 54 cases illustrates the relative probability of a cure in the different histological types:

	Cases.	Cured.
Fibrospindle-celled sarcoma . . . . .	6	3
Fibromyxosarcoma . . . . .	7	3
Giant-celled sarcoma . . . . .	2	2
Spindle- and round-celled sarcoma . . . . .	16	4
Round-celled sarcoma, perithelial . . . . .	7	0
Lymphosarcoma . . . . .	6	1
Psammoma . . . . .	1	1
Inoperable, operations refused, etc. . . . .	9	0
	54	14

That there have been but 14 cures out of 45 apparently operable cases, notwithstanding the most radical excision, must be looked upon as evidence supporting the most recent view in regard to the proper attitude toward apparently innocent tumors. Two recent observations

<sup>1</sup> *PROGRESSIVE MEDICINE*, December 1907, p. 209, Fig. 21.



of endothelioma illustrate this most emphatically. These two patients had small subcutaneous nodules, one near the sternoclavicular joint, the other on the extensor surface of the great toe. These nodules remained the size of the end of the little finger for years. In this stage they could have been removed without difficulty. Then they began to grow. The patients came under observation when the local growth had reached considerable size; the one on the toe had ulcerated, and after amputation of the foot the patient returned with glands in the groin. The other patient after a radical excision returned with a recurrence.

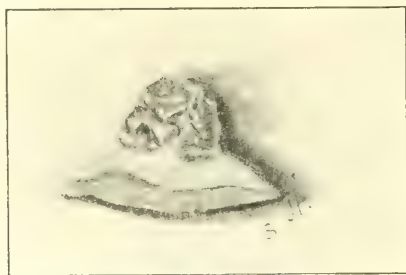


FIG. 12.—Sarcoma of skin.

## FRACTURES

In general, the literature concerns itself chiefly with the discussion of what method of treatment will give the best results in all cases. Three methods stand out prominently, each associated with the name of its chief advocate, each advocate applies his own method to practically all cases and claims perfect anatomical and functional results. With Bardenheuer we associate the extension methods, with Lucas-Championnière the treatment by massage and passive motion without splints, and with Arbuthnot Lane the open, operative method, in which, after reduction of the fragments they are held in place with steel plates and screws.

At the present time Lane's method is most popular. In my mind, the most important contribution of Mr. Lane is the remark that people should demand better results in recent fractures. I am confident that the results in this country are not what they should be. What one should insist upon is good results.

I might remark here that in some cases these "perfect" results may react in an unexpected manner. Some four years ago I began to use Whitman's abduction treatment in fracture of the neck of the femur. In my first case, the result was absolutely perfect anatomically and functionally. I had never seen, nor expected, such a result. One would have been unable to prove that the patient ever had a fracture, except

by the *x*-rays. In this case the patient claimed that he never had a fracture, and two surgeons in this city told him that it was impossible, because after a fracture of the neck of the femur such a result had never been accomplished.

We find so many references in recent literature to the treatment of fractures, that I am confident that all surgeons are beginning to feel, as Lane does, that the results after treatment of fractures should be better and that the public should be educated to expect these better results.

**Etiology of Fracture.** As the theme of this contribution to PROGRESSIVE MEDICINE is to emphasize the relation of the local lesion to some general condition of the body, either as cause or effect, it should be mentioned here most prominently that in all recent fractures the possibility of a local disease of the bone or some general condition of which the bone fracture is only a part should be borne in mind. A fracture may be the first symptom of a bone cyst, or any variety of primary medullary sarcoma of bone, or the first sign of a concealed primary carcinoma which has metastasized to bone. The fracture may be associated with some disease of the skeleton, as osteomalacia, multiple myeloma. Karl Beck<sup>1</sup> considers pathological fractures in osteopsathyrosis; Troemner and Preiser<sup>2</sup> and Baum<sup>3</sup> discuss fractures which may take place in *tabes dorsalis*. Troemner and Preiser describe a fracture of the foot which they have observed as the initial symptom of locomotor ataxia. I have described, in PROGRESSIVE MEDICINE, arthritis as the initial symptom, but I have never observed a fracture as the first sign.

**Diagnosis.** Today, in view of the Röntgen rays and our accumulated knowledge of fractures themselves and of the relation of pathological fracture to a local bone disease or some general disease, our responsibilities are much greater. After an injury to an extremity or to any bone the physician must not only ascertain whether there is a fracture or not, but whether the fracture is due entirely to the trauma, or whether the bone itself is the seat of some local disease, and whether this local disease at the seat of the pathological fracture is part of a general osseous lesion, or metastatic from a primary focus elsewhere. Therefore, in an injury to bone with the possibility of a fracture the physician must insist that his responsibility includes all the above, and refuse to treat the case if the patient is unwilling to allow this more detailed examination which includes the *x*-rays.

In recent fracture also it is incumbent upon the physician who sees the patient first to bear in mind the possibility of injury of tissue other than bone, often when there is a distinct fracture clinically, examination to find out if other tissues have been torn is neglected. Here is the most

<sup>1</sup> Surgery, Gynecology, and Obstetrics, 1910, vol. x, p. 583.

<sup>2</sup> Mitteilungen a. d. Grenzgeb., 1908, vol. xviii, p. 745.

<sup>3</sup> Deutsch. Zeitschr. f. Chir., 1907, vol. lxxxix, p. 1.

important moment to catch and repair the injured bloodvessel before gangrene sets in.<sup>1</sup> In the recent state, also, the injured nerve, the ruptured tendon or muscle should be recognized and repaired.

As a rule, one can get a fair idea from the history of how the fracture was sustained and the clinical signs of the fracture. In the majority of cases diagnosis as to the fracture itself is quite possible without the use of the *x*-rays. Bockenheimer<sup>2</sup> calls attention to the frequency of typical fractures after injuries in different sports. For example, the ski runner who strikes his foot with a following twist of the body around the limb usually sustains a spiral fracture of the upper third of the femur. Skaters most frequently sustain the typical Pott's malleolar fracture; runners, fractures of the metatarsal bones; football players, of the astragalus; roller skaters, fractures of both bones of the lower third of the forearm; chauffeurs, in cranking machines, Colles' fractures; jockeys and bicycle riders, fractures of the clavicle; gymnasium students and turners, supracondyloid and intracondyloid fractures of the humerus. Now, although this may be true in many instances and should be considered in the diagnosis, it does not always hold true. The last two chauffeur fractures which I have observed from cranking were not Colles', but both bones of the forearm were fractured in the middle third.

If but one *x*-ray is to be taken, it is better to do so after reduction than before, because on this *x*-ray may depend the decision whether operation is indicated or not. In studying the *x*-rays there should always be two views, for only in this way will the torsion, oblique and spiral fractures be properly portrayed. I have discussed these in detail in previous numbers of *PROGRESSIVE MEDICINE*. Zuppinger,<sup>3</sup> whose contributions I have previously reviewed, again gives his ideas on the mechanism of torsion fractures, but as the chief theme of this discussion of the subject fractures is treatment, I shall not digress to the more interesting but less practical phases.

**Treatment.** It is to be understood that the diagnosis has been made. This is always possible with the *x*-rays. Now, what shall be the treatment? Lucas-Championnière,<sup>4</sup> in his latest monograph, still advocates his method of massage and passive motion without fixation dressing. Whether one accepts his views in the whole or in part, everyone now agrees that massage and passive motion and other means which improve the circulation of the limb and maintain muscle tone are part, at least, of any method of treatment. Few surgeons, however, accept this French surgeon's view in its entirety. Bardenheuer, to whom I have

<sup>1</sup> In *PROGRESSIVE MEDICINE*, December, 1907, p. 159, and December, 1899, I have discussed the literature of this subject.

<sup>2</sup> *Centralbl. f. Chir.*, 1911, vol. xxxviii, p. 834.

<sup>3</sup> *Beitr. z. klin. Chir.*, 1909, vol. lxiv, p. 562.

<sup>4</sup> Review in *Centralbl. f. Chir.*, 1911, vol. xxxviii, p. 84.



again and again referred here, is of the opinion that extension is the method of treatment in practically all cases. The literature is filled with communications from the pupils<sup>1</sup> of Bardenheuer giving the results of this extension treatment. Lane<sup>2</sup> still continues to advocate the operative method of all fractures.

The consensus of surgical opinion throughout the world does not accept any one of these methods of treatment as applicable to all fractures. On the whole, perhaps, today Lane's views are more generally accepted than Bardenheuer's or Lucas-Championnière's, and surgeons are interested in establishing what is the best method of treatment for the different special fractures.

**REDUCTION.** All agree that proper reduction is the beginning of treatment. Lerda<sup>3</sup> apparently was the first to employ local anesthesia in the reduction of fractures, and he used cocaine. Quenu<sup>4</sup> reported favorably on his experience with Lerda's method in fractures and later<sup>5</sup> he employed the method to reduce dislocations. He uses novocaine and injects it into the muscles and tendons about the fracture and about the nerve, if possible, and in the joint capsule, tendons, and ligaments about the joint. Both Quenu and Lerda claim that this reduces muscle spasm and allows reduction of the dislocation or fracture without pain. I have never attempted it, but I am impressed that this is an important practical suggestion for cases in which general anesthesia is distinctly contraindicated. It is unnecessary to state that the technique should be as good as for an open operation. Crile now employs, as a routine in all his operations, local infiltration of novocaine, 1 to 400, in addition to the nitrous-oxide-oxygen anesthesia. Crile is quite certain that in laparotomies this infiltration prevents muscle spasm, which is so annoying in nitrous-oxide anesthesia. I have just returned from a visit to his clinic, and can give testimony of a very favorable kind.

**PLASTER.** I must confess that personally I dislike plaster of Paris in the treatment of fracture. It makes frequent change of dressings for massage and passive motion difficult. But sometimes it must be employed. H. Freiberg<sup>6</sup> suggests that the plaster bandage be rolled in several turns of tissue paper similar to that used for paper napkins. When the bandage so wrapped is placed in water no plaster is lost, so there is not only economy in plaster, but all of the plaster on each bandage gets into the dressing and time is saved. This seems to be a good suggestion, and a reviewer<sup>7</sup> confirms it. It also should save plumbing repairs.

<sup>1</sup> Grune, *Deutsche Zeitschr. f. Chir.*, 1911, vol. cx, p. 211.

<sup>2</sup> *British Medical Journal*, October 8, 1910.

<sup>3</sup> *Centralbl. f. Chir.*, 1907, vol. xxxiv, p. 1417.

<sup>4</sup> *Ibid.*, 1909, vol. xxxvi, p. 1383.

<sup>5</sup> *Ibid.*, 1910, vol. xxxvii, p. 95.

<sup>6</sup> *American Journal of Orthopedic Surgery*, vol. vii, No. 2.

<sup>7</sup> *Centralbl. f. Chir.*, 1910, vol. xxxvii, p. 568.

**Splints.** Although the highest authorities on the treatment of fracture agree with the principles of Lucas-Championnière in regard to the efficacy of early massage and passive motion, they do not discard splints, and whether the fracture is treated by operative fixation or not, after reduction some form of fixation splint is necessary—the simpler the better. I have given my objections to plaster. In the majority of cases, fixation can be accomplished with padded wooden splints held by adhesive straps or wide tape. Walter G. Stern<sup>1</sup> describes the non-inflammable celluloid splints and braces. The original should be consulted. This form of splint impresses one as economical, simple, and practical.

In fractures near joints, a splint which allows motion in the joint would undoubtedly shorten the period of disability and prevent stiffness of the joint—a result not uncommon and a complication which often requires considerable time to overcome it. Adolf Linhart<sup>2</sup> describes such articulating splints which are illustrated in Figs. 13, 14,

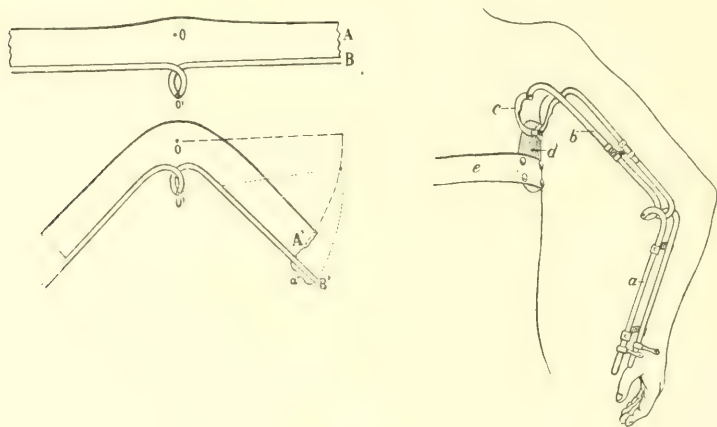


FIG. 13

and 15. The mechanism can be understood from the illustrations. I might digress here for a moment. Surgeons with no orthopedic training often fail to get perfect results when their operative part is above criticism. This failure is due to the neglect of orthopedic apparatus in the after-treatment. For example, I have seen a group of cases of subperiosteal resection of bone for chronic osteomyelitis. In the group treated by the general surgeon whose interest ceased after the operation there was hardly a case without some deformity, yet there was no fault in the regeneration of bone. The after-treatment of these cases had either been neglected or faulty. In another group seen at

<sup>1</sup> *Surgery, Gynecology, and Obstetrics*, 1911, vol. xii, p. 77.

<sup>2</sup> *Beitr. z. klin. Chir.*, 1910, vol. lxxvii, p. 444.

the same time in another clinic treated by a surgeon with orthopedic experience there were no deformities. The after-treatment in this latter group had been most carefully supervised and proper orthopedic apparatus employed.

The beginning of the treatment of a fracture is with its reduction and the proper approximation of the fragments. But whether or not an operation is performed for fixation, the treatment by no means ends here. It should continue until bone union is complete. No one should

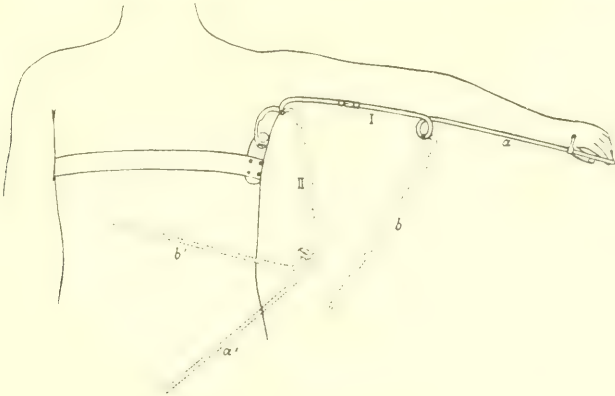


FIG. 14

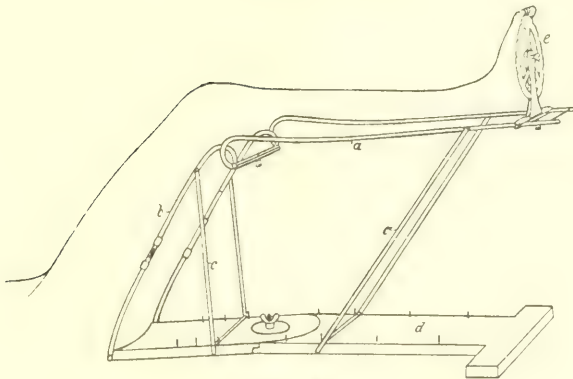


FIG. 15

be content to look upon solid bony union as the only factor. In addition to this there must be no deformity; muscle tone must have been maintained and joint motion not restricted. In addition, the period of disability should be short, and during this time the patient should have the least discomfort. All this can be accomplished by intelligent and continuous supervision. I again make the statement that it is my opinion that in this country neither in the largest and best hospital clinics, nor in private practice, are the results of the treatment of ordinary fracture as good as they should be.



**EXTENSION.** *Nail Extension.* In *PROGRESSIVE MEDICINE* for December, 1909 (p. 168), I first called attention to Steinmann's nail extension, whose original contribution appeared in 1907. Since then most of the literature on extension deals with this method. Steinmann soon found that, although he may have originally conceived this scheme of extension, it had been previously employed by Codivilla,<sup>1</sup> in Bologna. The Italian surgeon always drives the nail through the os calcis, and he first employed it in coxa vara. Undoubtedly Steinmann's communication came at a psychological moment and was immediately adopted. Codivilla,<sup>2</sup> in his recent paper, summarizes the development of the method, replies to Steinmann's remarks on priority, and gives his experience. Fig. 16 illustrates the nail extension with plaster above

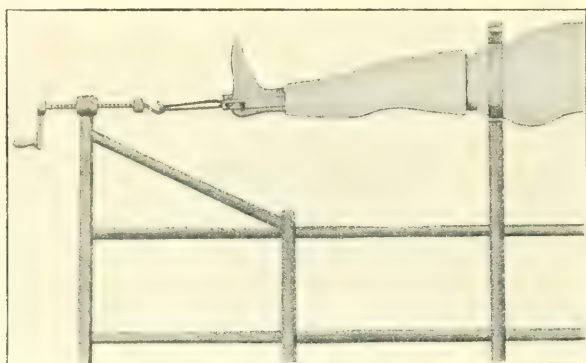


FIG. 16

and below the fracture, in this case, of the lower end of the femur. The efficacy of the method is most beautifully shown in the *x*-rays before and after treatment (Figs. 17 and 18). Lucas-Championnière, of course, would not attempt his method in such a fracture, at least, I hope not, and I challenge Bardenheuer and Lane to show any better reposition of the fragments.

Operative treatment cannot replace extension. In compound and infected fractures, fixation of the fragments may be contraindicated; here the wound must be left open, and the only hope of a good result rests with extension. Often the adhesive straps cannot be applied; the complicated plaster extension cannot compare with the simple nail.

In old fractures with over-riding, with or without union, extension with the nail, and more effective weight may allow a later freshening of the ends and suture to be made with less shortening. It would be preliminary to the operative treatment if there were non-union; it would be intermediate to the two operations if there were union with

<sup>1</sup> *Zeitschr. f. orthop. Chir.*, 1903, vol. xii.

<sup>2</sup> *Ibid.*, 1910, vol. xvii, p. 404.

over-riding. This is often overlooked. In some rachitic deformities, this nail extension may be effective. In some fresh fractures, especially the epiphyseal, extension by means of the nail may be found more effective than the complicated operative reduction. Codivilla,<sup>1</sup> in a more recent short contribution on the indications, advises it for coxa vara, fresh fractures of the femur and leg of the spiral and oblique type; for compound fractures due to gunshot wounds, and those I have already mentioned. Heinemann<sup>2</sup> gives the experience of 15 cases treated in Poppert's clinic in Giessen. The nail employed for extension is that previously illustrated by me.<sup>3</sup> Most of Heinemann's cases are illustrated in x-ray sketches. They are chiefly fractures with over-riding

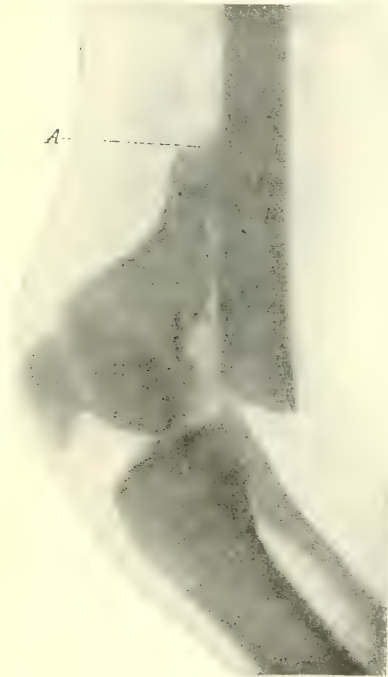


FIG. 17



FIG. 18

of single or both bones, many comminuted. Although the extension seems to have overcome the shortening in most of the cases, in many the approximation of the fragments by no means compares with that of Codivilla (Figs. 17 and 18), and I am confident that in many of these cases the result, both anatomically and functionally, would have been better after open incision, approximation, and plating, if this was not contraindicated. Anschütz<sup>4</sup> gives his experience with this method

<sup>1</sup> Centralbl. f. Chir., 1911, vol. xxxviii, p. 888.

<sup>2</sup> Deutsche Zeitschr. f. Chir., 1911, vol. cviii, p. 372.

<sup>3</sup> PROGRESSIVE MEDICINE, December, 1909, p. 169.

<sup>4</sup> Deutsche Zeitschr. f. Chir., 1909, vol. ci, p. 429.

in his clinic in Kiel. Numerous *x*-ray sketches accompany the article, showing the position of the fragments before and after reduction. In some the approximation is good, in many only fair; that is a reduction one should not be content with, unless operation and plating were contraindicated. Anschütz<sup>1</sup> reported his further experience before the German Surgical Congress in 1910. In the report of this Congress in the *Centralblatt für Chirurgie* there is but one other contributor to this subject—Steinmann.<sup>2</sup> At this time the latter describes some modifications and developments in the method of extension which are chiefly in the drill, the type of needle, and in the method of applying the weight somewhat on the principle of the ice-tongues (Fig. 19). Stein-

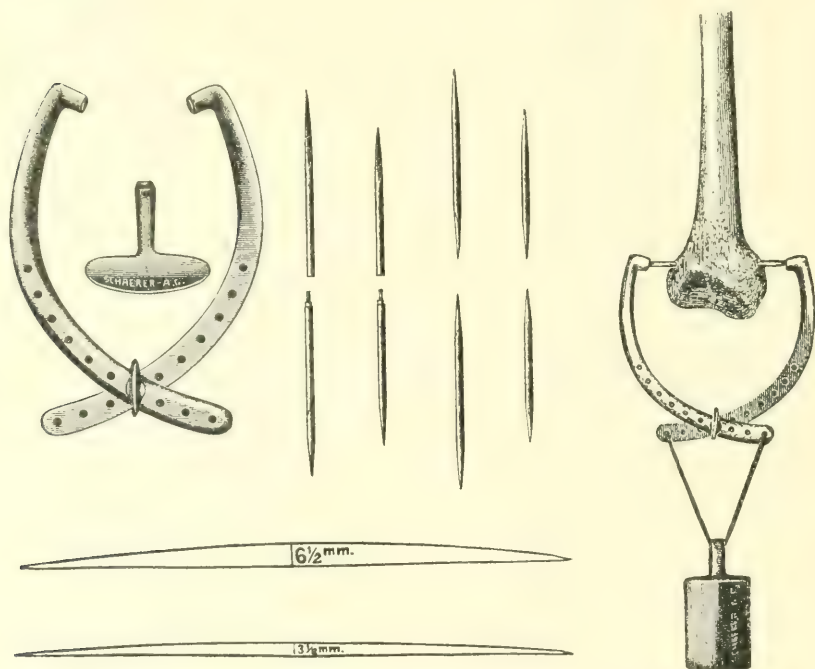


FIG. 19.—Steinmann's simplified apparatus for nail extension.

mann still employs extension from the lower end of the femur as well as the os calcis, while up to the present time Codivilla drives the nail through the os calcis only. Anschütz<sup>3</sup> gives his experience to the American readers in an article translated by Dr. Potts, of Chicago. Figs. 20 and 21 portray the simplicity and practicability of the method in compound fractures of the leg. One interested in the controversy between Steinmann and Codivilla on the authorship of nail extension

<sup>1</sup> Centralbl. f. Chir., 1910, vol. xxxvii, Supplement, p. 28.

<sup>2</sup> Ibid., p. 30.

<sup>3</sup> Surgery, Gynecology, and Obstetrics, 1910, vol. x, p. 419.



may read Steinmann's side in the *Centralblatt für Chirurgie*.<sup>1</sup> Vöckler<sup>2</sup> is the first to employ nail extension to the os calcis for bilateral fracture



FIG. 20.—Nail extension in complicated infected fracture of the leg.



FIG. 21.—Fracture with posterior dislocation of the foot.

<sup>1</sup> 1910, vol. xxxvii, p. 153.

<sup>2</sup> *Centralbl. f. Chir.*, 1911, vol. xxxviii, p. 349.

of the femur. All of these surgeons are of the opinion that this method should be carefully supervised. The danger of infection about the nail seems to be very slight, but all of these cases have been treated in hospitals under careful supervision. As a matter of fact, the cases in which this method is applicable are only of the character to be treated in a hospital. So the advice by most of these surgeons that this method should not yet be employed in the treatment of fractures at the patient's home seems unnecessary.

EXTENSION BY OTHER METHODS. Apparently nail extension brings out no new principle. It is simply a method for obtaining extension without complicated apparatus. The traction can be made on the limb in extended or flexed position. Apparently the only objection is the possible danger of infection, or injury to the bone, but so far, as to this actual occurrence, I am unable to find recorded any serious results. My associate, Dr. McGlannan, at the St. Agnes Hospital, at my suggestion, has employed this during operation for traction and for treatment in non-operative cases with good results.

During the last two years, while references to this method of extension are more numerous than to any other, nevertheless the advocates of the Bardenheuer method and modifications continue to make important contributions.

In *PROGRESSIVE MEDICINE*, December, 1909 (p. 164), I described and illustrated Zuppinger's apparatus, the principle of which is traction on the lower limb with flexion at the hip and knee.

Henschen<sup>1</sup> contributes a most extensive article, in which he advocates, in the treatment of fractures of the leg and thigh, traction on the semiflexed hip and knee. His apparatus consists of a cloth hammock in which the limb swings. Zuppinger<sup>2</sup> comments most favorably on Henschen's monograph and quite naturally so. He also calls attention to the historical fact that Percival Pott, in 1768, was apparently the first to announce the principle that it required less traction if the muscles of the lower extremity were first relaxed by semiflexion of the knee and hip. Although Pott's theory was good then, and still remains good, his methods did not appeal either to French or German surgeons at that time. He had some followers in England. It is Zuppinger's opinion that Pott's methods were faulty. Zuppinger does not mention the American surgeon Smith, who devised his anterior splint, which suspends the lower extremity and applies traction in semiflexion of the joint.

It is interesting to observe that history repeats itself. Heinrich Landwehr,<sup>3</sup> writing from Bardenheuer's clinic, makes the same criticism of Zuppinger's apparatus that the German and French surgeons made

<sup>1</sup> *Centralbl. f. Chir.*, 1910, vol. xxxvii, p. 107.

<sup>2</sup> *Beitr. z. klin. Chir.*, 1909, vol. lxiv, p. 567.

<sup>3</sup> *Zeitschr. f. orthop. Chir.*, 1910, vol. xxvii, p. 447

of Pott. He admits the principle and the importance of obtaining relaxation of the muscles by semiflexion which Zuppinger and Henschen insist upon, but is of the opinion that their methods and apparatus are too complicated to be understood and employed intelligently and successfully by the general practitioner. Landwehr also contradicts the statement of these his two German colleagues that Bardenheuer's methods of extension for fractures of the leg and thigh do not give some relaxation of the muscles by semiflexion. It is quite true that the flexion is not as much as that obtained by the apparatus of Zuppinger and Henschen, but apparently Bardenheuer and his pupils think it is sufficient. In Bardenheuer's apparatus, the leg rests upon a pillow. This, of course, gives some flexion at the knee and hip. Fig. 22 illustrates the simplicity of Bardenheuer's apparatus as compared with those which I reproduced in 1909 from Zuppinger. Then Landwehr gives some



FIG. 22

good *x*-ray pictures of fractures before and after treatment. First, there are six fractures of both bones of the leg with overlapping of the fragments, some spiral, some oblique, some comminuted. On the whole, the reduction and the healed position of the fragments is satisfactory. Lane and his followers would operate always for fractures of this type, and I am inclined to think their anatomical results would be better, although in many fractures of the leg, with slight displacement of the fragments, there is no impairment of the function. Then there are reproduced some *x*-rays of fractures of the femur. In one (his Fig. 8, *a*), there is a subtrochanteric spiral fracture which, after eight days' extension in a hammock by a method analogous to that of Henschen, still showed overlapping, angular and rotatory displacement. Then they employed the ordinary extension method of Bardenheuer which I have illustrated, and Landwehr gives an *x*-ray taken ten days after this extension. The fragments are in a much better position and apparently



satisfactory to Landwehr. If one is justified in taking this *x*-ray as illustrating with what result Bardenheuer and his pupils are content, one may at once conclude that they are after functional and not anatomical results. The position of this subtrochanteric spiral fracture, which Landwehr looks upon as good enough, is by no means anatomically perfect. Undoubtedly the position is good enough for solid bone union, perhaps for a fair functional result, but, personally, I would never allow such an imperfect position to go without an attempt to correct it by operative means.

We see, therefore, that in this clinic undoubtedly the method of extension treatment is employed more than in any other place in the world, and, in addition, supervised by those who thoroughly understand the apparatus. Yet their results are often faulty, from an anatomical standpoint. I, of course, cannot speak of the functional result. The estimation of the functional result depends more upon the patient than upon the surgeon. Many are content with a comparatively poor result, as many individuals are content with poorly fitting clothes. The average individual has been educated to expect some shortening and functional disturbance after all fractures, and so long as there is bone union and they can use their arm or walk on the limb, they are satisfied. They have not been educated to the fact that with proper treatment the results in most fractures should leave a limb as useful and as strong as before the fracture. I have again and again, in *PROGRESSIVE MEDICINE* and elsewhere, in discussing Bardenheuer's methods of extension, called attention to the fact that often the anatomical results are poor, as shown in the reproduced *x*-rays. Yet you never read in the text anything but satisfaction with the result. There is no doubt that, in many fractures, extension will give just as good anatomical and functional results as the open operation reduction and fixation of the fragments with plates and screws. Extension is, perhaps, the most important method in the conservative treatment of fractures, but it can be carried too far. Nevertheless, the general practitioner not in a position to give his patients the benefit of the operative treatment must remember and understand the principles of the extension treatment. The danger of a bad functional result or non-union from over-riding is undoubtedly much less when the fracture has been treated by extension than by any other method of conservative treatment.

Landwehr then gives an *x*-ray of an oblique fracture in the upper third of the femur in which the result after extension is anatomically perfect. It is my rule in these cases to first try extension. If the *x*-ray shows the fragments in perfect position, it is continued. If the fragments are not in absolute approximation I operate.

In the *x*-rays of two fractures of the shaft of the femur reproduced by Landwehr, I would not be satisfied by the anatomical result. In

both, there is slight angular deformity which is very apt to increase after the patient is up and about.

In my experience, I have operated more for fractures of the shaft of the femur than in the region of upper or lower end.

Hogart Pringle<sup>1</sup> favors extension treatment. He says the clinical results are good enough.

Reucker,<sup>2</sup> Knoke,<sup>3</sup> and Wildt<sup>4</sup> all suggest modifications of Bardenheuer's method of extension for fractures in the lower third of the leg and in the region of the malleoli. They claim that in Bardenheuer's method, in which the adhesive plaster extends above the line of fracture, the tension is insufficient on the lower fragment. Ruecker adds to the straight traction two pieces of adhesive straps which act like a boot and allow traction in two other directions (Figs. 23 and 24). He objects

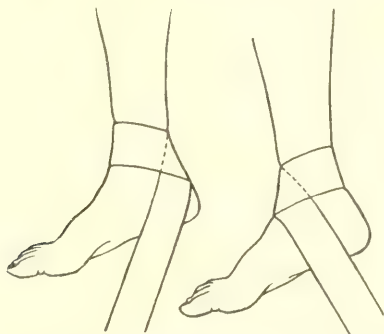


FIG. 23.—Lower tension. Upper tension.

to nail traction through the os calcis on account of the danger of infection. Knoke, after padding the foot and ankle most carefully, applies a plaster which is divided longitudinally, anteriorly, and posteriorly, so it can be removed. After it has hardened it covers the foot and ankle like a shoe, is held in place by a bandage, and the extension strips can be attached to this. This method appeals to me as having advantages over Ruecker's—it is less complicated and the shoe can be removed at frequent intervals for passive motion and massage. Wildt introduces between the adhesive strips at the position of the fracture a piece of rubber, and claims that traction with this modification is more efficacious than without it. In my experience with fractures of the lower third of the leg and in the region of the malleoli I have never employed extension. When I could not reduce the fragments and keep them in proper position without extension, but with simple splints, I have always operated; but my experience with fresh fractures in this locality

<sup>1</sup> Practitioner, August, 1909; reviewed in *Centralbl. f. Chir.*, 1910, vol. xxxvii, p. 417.

<sup>2</sup> *Centralbl. f. Chir.*, 1910, vol. xxxvii, p. 113.

<sup>3</sup> *Ibid.*, p. 497.

<sup>4</sup> *Deutsche Zeitschr. f. Chir.*, 1910, vol. cvii, p. 187.

is limited. During the same time I have had a larger experience with the same fracture treated elsewhere in plaster, in which there was union with deformity and great functional disturbance due to the changed position of the foot and lower fragment. There is no doubt about the large number of faulty results from fractures in this region, and I am quite certain that, in the hands of the less experienced, extension will give better anatomical and functional results than plaster or ordinary splints, and Knoke's method appeals to me as the simplest scheme for traction without the danger of pressure decubitus.

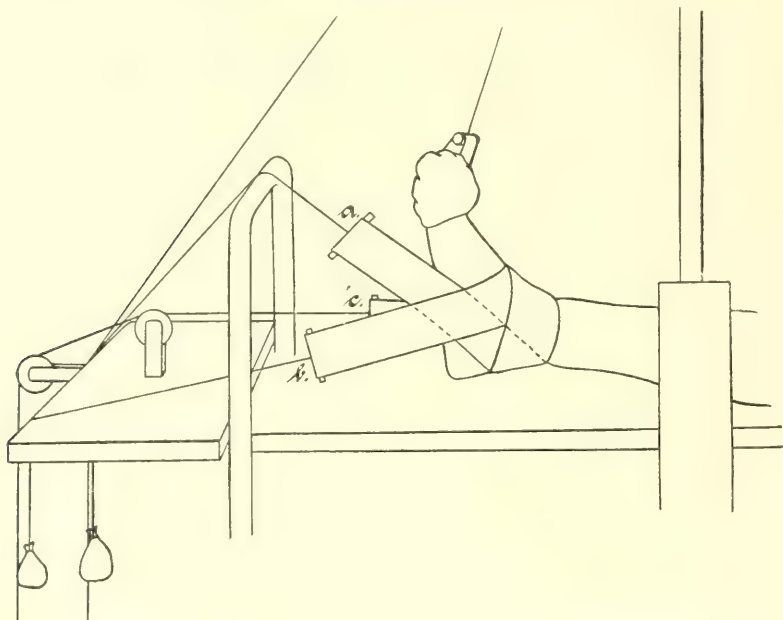


FIG. 24.—*a*, upper tension; *b*, lower tension; *c*, longitudinal tension.

**OPERATIVE TREATMENT.** I have kept up a critical discussion of the literature in *PROGRESSIVE MEDICINE*<sup>1</sup> since 1902. The accumulated literature since then does not give any evidence to influence me to change my views on this subject. I have been conservative. I have always taken the position that the results of treatment of fracture in the fresh state should be anatomically and functionally good. The moment it is demonstrated that open incision with reduction and fixation of the fragments gives better results than conservative treatment, then operation is indicated.

In any case, an operation for the reduction and fixation of a fracture is major surgery. It should only be performed under the best surgical environments. In many cases the operations are most difficult, be-

<sup>1</sup> December, 1902, p. 94; 1903, p. 118; 1905, p. 206; 1906, p. 173; 1907, pp. 153 and 166; 1909, p. 151.



cause of technical and mechanical obstacles. Vessels and nerves have to be avoided. In fractures near the joints, especially the elbow, the fragments are small, and moulding into their proper position is difficult. In other fractures, especially the femur, there must be means for instituting torsion to overcome muscle rigidity.

As my experience grows with the open treatment of fractures, my respect for the difficulties increases. It is not surgery for the inexperienced. Operations for appendicitis, gallstones, and intestinal suture are, as a rule, much less difficult than many of the operations for fracture. Undoubtedly in the recent state the technical obstacles in the operative treatment of fracture are least and greater as the time after the fracture increases. I would advise the surgeon who suddenly decides to begin the open treatment of fractures on account of the popular writings of Lane to arm himself with Lane's instruments and, if possible, to witness his technique.

American surgeons, so far as I can make out from the literature and personal communications, are adopting Lane's view more than his own colleagues and more than German and French surgeons. Lane<sup>1</sup> continues the discussion with his further experience and does not retract. He operates on all fractures in their recent state, and fixes the fragments with a steel plate and screw. I cannot speak of his results, but he claims that the results of the open treatment for fracture when they become known to the public, and especially to the judge and jury, will force surgeons to adopt this method. I can find only one reference<sup>2</sup> from English surgeons advocating Lane's method. Among American surgeons perhaps Edward Martin,<sup>3</sup> of Philadelphia, has been most interested in the operative treatment. In 1910 he makes a very important contribution in a method for traction on the lower fragment to be employed especially in fracture of the femur with great over-riding. This contribution deals entirely with this method of traction, and in certain old fractures of the femur, in which there is over-riding with or without union, the entire success of the operation, if one does not wish to produce too much shortening by resection, depends upon an efficient method of traction. I have witnessed one of Martin's operations, and can testify to the simplicity and efficiency of his traction method (Figs. 25 and 26). In the more recent meeting of the American Surgical Association, last June, Martin delivered a paper in which he confined himself to the open treatment of transverse fracture of the femoral shaft, and advocated the open treatment in the recent state with fixation with strong steel plates and steel screws. He emphasizes the importance of having the proper implements and appliances to meet and overcome the obstacle. He follows pretty closely Lane's technique.

<sup>1</sup> British Medical Journal, October 8, 1910, and Practitioner, November, 1910.

<sup>2</sup> F. N. G. Starr, British Medical Journal, July 9, 1910.

<sup>3</sup> Transactions of American Surgical Association, 1910, vol. xxviii, p. 578.

He has observed some delay in bone union which he thinks is in proportion to the stripping of the periosteum over the fragments. But Martin is quite positive, from a comparison of the results in his own

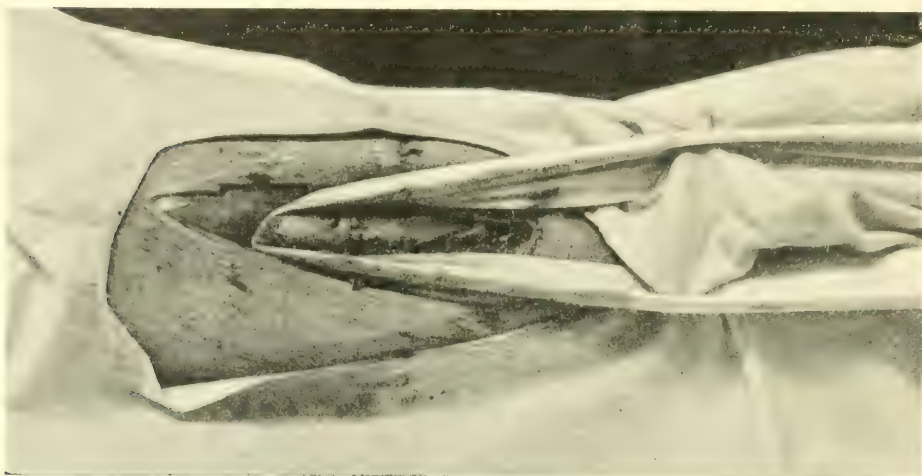


FIG. 25.—Canvas strip passed over the proximal end of the distal fragment.

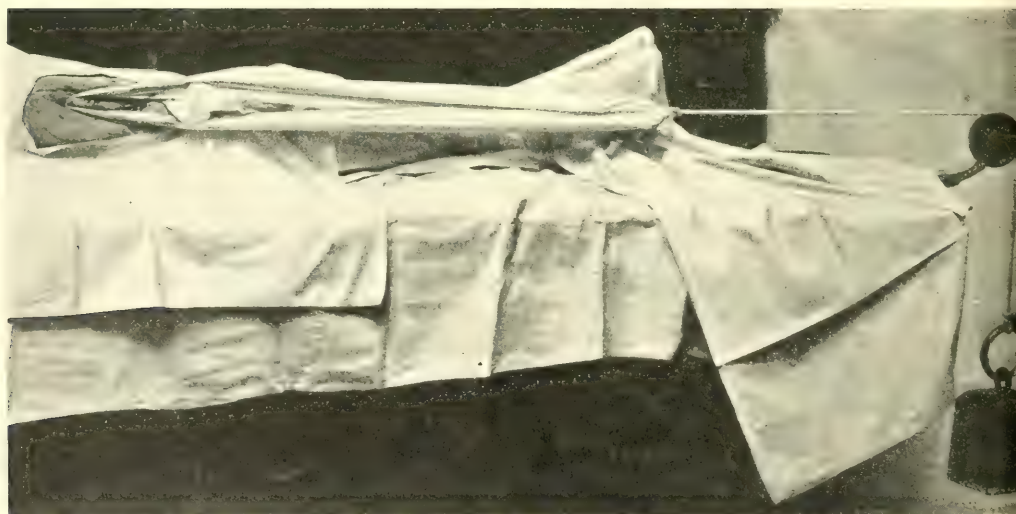


FIG. 26.—Canvas strip looped over the proximal end of the distal fragment and attached to a fifty-pound weight. Traction applied directly to the bone.

experience with fractures of shaft of the femur, that the open method should always be chosen, as there is no doubt in his mind that the results are far better; but he does not advise the open method in *all* fractures. The discussion gives, to a certain extent, the present views

of American surgeons on this subject. One is struck with the fact that no one has had a large experience. Huntington, who has investigated the opinion of American surgeons most thoroughly, states that four years ago not more than 18 per cent. of American surgeons were familiar with the details and merits of the open treatment of fracture, while today 95 per cent. or more are willing to adopt it in certain cases. Bristow, of Brooklyn, reported an experience of 9 operations during the recent year in fresh fractures. In every case the result was good.

Ransohoff is of the opinion that it is one of the most dangerous operations, except in the hands of an expert. Lund, of Boston, reports an experience with 12 cases. He agrees with Martin in regard to the importance of proper instruments and apparatus. Bevan, of Chicago, favors the operation only in selected cases, and then in the hands of the most experienced surgeon. Gerster has employed it with success in the comminuted fractures of the lower end of the humerus. Harris has found the fixation with plates and screws most satisfactory in compound fractures, even when the wound has been left open.

We can see from this that as yet American surgeons have not had a large experience in the operative treatment of fractures.

William Hessert,<sup>1</sup> of Chicago, comes to the following conclusions:

1. If a fracture cannot be reduced and kept reduced, then operate.
2. Double fractures of long bones should be plated.
3. If you must operate, then bury as little hardware in the wound as possible.
4. Do not attempt to operate unless equipped with the proper instruments.
5. Fractures that are plated may suffer delayed union, while fractures that are operated without the use of foreign material heal as rapidly as closed fractures.
6. Most of the plates, screws, wire, etc., must eventually be removed.
7. Do not cut down on a badly comminuted fracture.
8. Do not immobilize too long, but employ splints that will allow of early passive motion and massage.

F. J. Cotton,<sup>2</sup> of Boston, seems to have had as much experience as any American surgeon. He was one of the first, in Boston, at least, "to do routine open operative work on fractures," and he writes that as his experience has increased he has become more radical. In his opinion, operation should be performed only because the non-operative results are bad. Operation should be the rule or routine in compound fractures, in fractures complicated by vessel or nerve injuries, in fractures of the patella or olecranon, in fractures with dislocation, especially at the shoulder and acromioclavicular joint. Now, as compared to Lane's

<sup>1</sup> Surgery, Gynecology, and Obstetrics, 1911, vol. xiii, p. 201.

<sup>2</sup> Journal of the American Medical Association, 1911, vol. lvii, p. 156.



views, this is a very narrow field for indication for operation. In these cases no other method of treatment is thought of.

In fractures of the carpus and shaft of the femur, one should operate if a trial of conservative methods fails. In the third group, one may often operate for fracture of the humerus and of the leg.

I can see that Cotton's views are changing as his experience with the operative cases increases, and I believe that this will be the development of every surgeon. As soon as he can demonstrate that his results after the operative treatment are better, he will attempt operation oftener and oftener.

Magnuson,<sup>1</sup> in some experimental work on lengthening shortened bones of the leg, devised an apparatus which would make traction and hold the fragments steady enough to insert the ivory screw. The extension and counterextension are well illustrated in Fig. 27.



FIG. 27

In the discussion before the Hungarian Surgical Congress, in Budapest, we see from the paper of Holzwarth and St. Sandor<sup>2</sup> that they hold also a comparatively conservative position. All the different methods which I have critically reviewed here were subject of discussion there. Each method of treatment—massage and passive motion, extension, fixation in plaster and splints, and open operation—were employed in suitable cases; in addition to these, various means to encourage bone union, chiefly hyperemia by Bier's method, or direct injection of blood into the seat of fracture, and other measures which I shall discuss later under the subject of bone union.

I find one French surgeon taking a view almost as radical as Lane—Lambotte.<sup>3</sup> He prefers to operate between the tenth and the fifteenth

<sup>1</sup> *Annals of Surgery*, 1911, vol. liv, p. 227.

<sup>2</sup> *Centralbl. f. Chir.*, 1911, vol. xxxviii, p. 539.

<sup>3</sup> *Ibid.*, 1909, vol. xxxvi, p. 1081.

day. Up to this time the fragments can be kept in a fair position by extension; massage will aid in absorption of the exudate, and he is of the opinion that the danger of infection is less. He employs gilded or nickel-plated steel plates and screws. I, too, prefer to wait a few days unless there is some indication which makes immediate operation necessary, as, for example, great pain, or pressure from the dislocated fragments, or inability to make the patient comfortable. This is rarely, however, the case.

At the same time, another French surgeon (Chaput<sup>1</sup>) takes the opposite view, and is of the opinion that the open method is rarely indicated.

Willems,<sup>2</sup> another French surgeon, expresses the opinion that in the majority of cases Bardenheuer's extension methods give sufficiently good results. Apparently he operates only in a very small group, and the indication of the operation is reduction of the fragments. He objects to any means of fixation by a foreign body, but after reduction closes the wound and puts the limb up in plaster. In a few cases in which I have operated to reduce the fracture the line of fracture has been of such a character that the fragments when replaced remained fixed and there was no necessity for any further fixation. This has occurred twice in my hands in fractures of both bones of the forearm. It is the irregular indentations of the fracture surfaces which render reduction without open incision almost impossible, but when reduction has been accomplished further fixation is not necessary.

In German literature, on the whole, there is less on this subject, especially of contributions dealing in generalities. They are really investigating the question from the proper standpoint. In the first place, they are studying the better methods of fixation of bone, not only as to material, but as to technique. Then, they are taking fractures of special types, subject them to operation, and compare the results with older methods.

Adolf Hoffmann,<sup>3</sup> after an experimental and clinical study, comes to the conclusion that nails made of bone are no better than metal screws or nails. There has been considerable difference of opinion with regard to the metal screw, the ivory peg, or the bone peg made from living bone at the time of operation. The latter is much more difficult to make technically, and if Hoffmann is correct it will save surgeons an unnecessary detail. Hoffmann's x-rays deal chiefly with fractures of the patella. Frangenheim,<sup>4</sup> from Lexer's clinic, gives a most remarkable experimental and clinical research on the possibility of bone transplan-

<sup>1</sup> *Centralbl. f. Chir.*, 1909, vol. xxxvi, p. 1081.

<sup>2</sup> *Ibid.*, 1911, vol. xxxviii, p. 85.

<sup>3</sup> *Archiv f. klin. Chir.*, 1909, vol. xc, p. 367; review in *Centralbl. f. Chir.*, 1909, vol. xxxvi, Supplement, p. 31.

<sup>4</sup> *Archiv f. klin. Chir.*, 1909, vol. xc, p. 437.

tation, especially in the employment of long pieces of bone as nails in stiffening flail joints and pseudarthroses. For example, Fig. 28 illustrates a piece of the fibula resected from the same patient driven through the os calcis into the tibia. Fig. 29 shows the change in this bone two years after operation. I will discuss bone transplantation more in detail under bone tumors.



FIG. 28

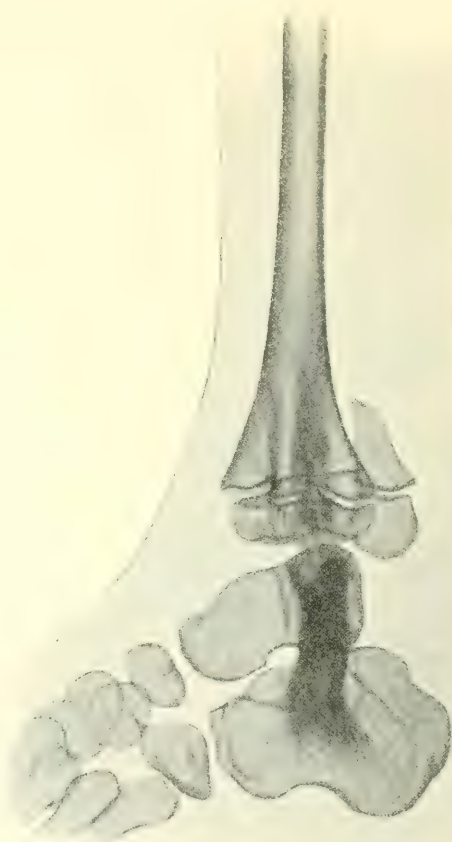


FIG. 29

Ludloff,<sup>1</sup> of Breslau, reports on his experience with six fractures of the forearm, only one of which was an operation in the recent state. He observed in all of them delayed union, and in two he had to remove the plate, but the functional and anatomical results were perfect. He also reports two open operations for fractures of the lower third of the

<sup>1</sup> *Centralbl. f. Chir.*, 1910, vol. xxxvii, Supplement, p. 27.



femur, with good results. From my own experience and from reading the literature I am inclined to the conclusion that delayed union and the later necessity of removal of the plate is usually due to faulty technique. Personally I have never seen delayed union, but I have been most particular not to injure the periosteum and to handle the tissues about the bone with greatest care and to improve the circulation after operation by passive motion and massage. When the bone plate can be buried beneath muscle, this in my experience rarely requires removal. But when, as in some fractures of the shaft of the tibia and the malleoli, there is nothing to cover it but skin and subcutaneous tissue, it usually has to be removed.

Rehn,<sup>1</sup> in discussing Ludloff's paper, took somewhat the position of Willems, the French surgeon. He calls attention to those fractures with serrated edges which, when reduced, remain fixed, and proposes to imitate this in other fractures, so the fixation will be by a bone mortise, instead of a screw plate or wire.

Wilms is of the opinion that the immediate operative treatment of fractures of the forearm gives far better results than any conservative method. When the line of fracture is oblique, Wilms finds wiring sufficient, but when the fracture is transverse he holds the bones together by a nail fixed in the marrow cavity along the principle of a rivet. I have never employed this method in the forearm, but I have always found considerable difficulty in drilling a hole for the screws, because the bones are small and difficult to hold during the procedure. This riveting method appeals to me. The nail is driven into the marrow cavity of one fragment after it has been provided with a groove about which a silk thread can be tied. This gives the operator something to pull when he comes to insert the peg in the marrow cavity of the other fragment. In fractures of the bone of the leg, Wilms uses an ivory peg.

Clairmont,<sup>2</sup> from his experience in von Eiselberg's clinic in Vienna, concludes that in certain fractures of one or both bones of the forearm or leg it is impossible either by Bardenheuer's extension, or by the special method of von Frisch,<sup>3</sup> of the same clinic, which is an attempt at reduction under ether, to reduce the fragments in all cases. When these attempts fail, Clairmont suggests a small or large incision for the reduction of the fragments, to be followed by fixation by some method if necessary. He makes the statement that he does not believe that good functional results are possible in fractures of the lower extremity unless the fragments are replaced in their normal anatomical relations. Here we have, therefore, the key to the operative treatment of fractures. The first step is reduction; if this cannot be obtained by extension methods or by manipulation under ether, or by some special maneuvers

<sup>1</sup> *Centralbl. f. Chir.*, 1910, vol. xxxvii, Supplement, p. 27.

<sup>2</sup> *Archiv f. klin. Chir.*, 1910, vol. xciii, p. 745.

<sup>3</sup> *Ibid.*, vol. xciii, p. 728.

as advocated by von Frisch, then this itself is an indication for operation. Undoubtedly, as our experience grows, we will be able to select, after the study of the Röntgen plate, those cases in which operation is indicated, and save these patients loss of time by extension, except for preliminary treatment, and unnecessary narcosis.

**Late Results.** Before taking up the subject of delayed union, pathological fracture, and compound fracture, it is important to call attention to two studies of fractures in children some months or years after the injury. Fritz König<sup>1</sup> is the first. He studies the later histories of many cases of fracture in children and gives some twenty *x*-ray reproductions. Later the same subject is considered by Birt,<sup>2</sup> also with splendid *x*-rays. They demonstrate a point with which most clinicians are familiar—that the deformity in fractures in children tends to grow less and the functional results are better as the years go on. Fortunately this is so in a certain number of cases, but I think it would be much better for the greatest number of children that this be forgotten. As König and Birt point out, in some fractures in children the deformity due to dislocation or angular displacement may ultimately correct itself, while in other cases the opposite is true, and the resultant deformity is not only disfiguring, but interferes with function in various degrees, and the deformities are difficult to cure by later operation. There has been sufficient experience to enable one to foretell this to a certain degree. But I am firmly convinced that one should attempt even in children to get a perfect reduction of the fragments with open operation if necessary, providing the operation can be done under proper environment by a skilled surgeon.

Bartsch,<sup>3</sup> from Lexer's clinic, gives the most interesting statistical study of fractures of the extremities between 1901 and 1903. This report is of interest chiefly in showing the special fractures associated with different ages; for example, if a child fall on its extended hand the force produces a fracture of both bones of the forearm, while if an adult fall in the same way he sustains a Colles fracture of the radius.

**Callus Formation.** Surgeons have been familiar for years with non-union in fractures and they have discovered local conditions as well as general that would lead to this failure of osseous union. Among local conditions are interposition of soft parts, overlapping of the fragments, infection with destruction of the periosteal and endosteal cells, separation of the fragments with a defect which later becomes filled with scar tissue and this itself prevents further ossification.

Then there are general conditions which interfere with ossification; syphilis, anemia, and malnutrition.

Fortunately, in the majority of cases, if the fractured ends are approxi-

<sup>1</sup> Archiv f. klin. Chir., 1909, vol. lxxxv, p. 187.

<sup>2</sup> Beitr. z. klin. Chir., 1909, vol. lxiv, p. 437.

<sup>3</sup> Archiv f. klin. Chir., 1909, vol. lxxxviii, p. 791.

mated there will be bone union. Into the granulation tissue which forms about the fracture special cells, both from the periosteum and marrow cavity, are the specific cells for bone formation. In the majority of instances, as I stated before, union takes place with perfect apposition. But sometimes, even in spite of this perfect approximation, ossification of the callus does not take place or is delayed. In all cases of fracture, union is more rapid and more solid at an earlier date if local circulation is improved by massage and passive motion and the general condition of the patient kept up by fresh air and exercise. For this reason, at the first sign of delayed union the surgeon should at once institute means to improve the circulation in the locality of the fracture and to better, if possible, the general condition of the patient. For local conditions, hyperemia is perhaps the best of all. It can be produced by a Martin bandage, or some form of baking apparatus, or hot application with clothes wrung out in hot water. The baking apparatus is the best. Then there is massage and passive motion. The literature is filled with other methods of exciting bone formation, especially in older cases of non-union which are called pseudarthroses.

Some authorities are of the opinion that the first essential element of treatment of a pseudarthrosis is to freshen the edges of the bones, cut out the scar tissue, bring the bone edges together, and, if the periosteum has been destroyed, to transplant periosteum, or, better, pieces of bone with periosteum. Other authorities begin local treatment before operation by injection of blood, fibrin, emulsion of periosteum, iodine, formalin. Then there are general means—thyroid extract, parathyroid extract, adrenalin, calcium salts, iron for the anemia, and salvarsan for syphilis.

I am inclined to the opinion that the more we become familiar with the technique of bone transplantation, the oftener will it be employed in pseudarthroses. Nevertheless, one should be familiar with these various local and general measures, because although these cases are comparatively few, they are very distressing from loss of function, and, if bone union can be brought about, surgery has without a doubt accomplished its highest purpose.

**Fibrin.** S. Bergel<sup>1</sup> contributes a very extensive experimental and clinical study on the employment of fibrin which he has had especially prepared for him by Merck and placed upon the market. He is of the opinion that injections of this fibrin in the region of the fracture has a specific effect on the osteoblasts, either periosteal or endosteal. Conrad Pochhammer,<sup>2</sup> who has contributed the most extensive monograph on callus formation,<sup>3</sup> answers Bergel's communication with the state-

<sup>1</sup> *Archiv*, 1910, vol. xciii, p. 755; review *Centralbl. f. Chir.*, 1910, vol. xxxvii, Supplement, p. 27; and *Archiv f. klin. Chir.*, 1911, vol. xcv, p. 16.

<sup>2</sup> *Archiv f. klin. Chir.*, 1911, vol. xcv, p. 23.

<sup>3</sup> *Ibid.*, vol. xciv, p. 352.



ment that fibrin acts mechanically only and has no specific effect like fresh blood.

**Fresh Blood.** Bier,<sup>1</sup> as I have discussed here in 1906, emphasized the importance of leaving blood clot in the region of the fracture, or, in old fractures, of injecting fresh blood. Hildebrand<sup>2</sup> disagreed with Bier's conclusions. Conrad Pochhammer<sup>3</sup> confirms Bier's statement in regard to the importance of blood clot in the region of the periosteal and endosteal osteoblasts. Next to this blood clot he prefers transplanted periosteum, with or without bone, or, better, if possible, a periosteal bone flap in which some of its vascular connections are preserved. Lyle<sup>4</sup> makes a short report before the New York Surgical Society. The patient was a male, aged forty-six years; he sustained a compound comminuted fracture of both bones of the leg; he was operated on in the recent state, the splinters were removed, the ends of bone trimmed. There was no union in three and one-half months. Then a second operation was performed with freshening and excision of the scar tissue—no success. Third operation—no success. Then the patient was allowed to walk with braces. One year after the first operation there was still non-union. The x-rays showed fibrous tissue between the ends of the bone. Now 20 c.c. of the patient's own blood were injected between the fragments. Six weeks later there was solid bone union, and the patient was walking. This sounds almost miraculous. It would appear as if the fresh blood stimulated into activity the dormant osteoblasts.

Vogel,<sup>5</sup> in a very extensive study, confirms Bier's first work.

I get the impression that there may be something of almost specific value in blood clot and injections of fresh blood.

**Periosteum.** Sasaki,<sup>6</sup> following the experiments of Nakahara and Dilger,<sup>7</sup> made a very extensive experimental study on the effect of injections of the emulsion of periosteum. The first experimenters demonstrated that if periosteum was injected into soft parts, muscle or tendons, bone formation took place, but emulsions of small particles of bone were not successful. Sasaki carried the experiments much farther, produced pseudarthroses in animals, and then treated with periosteal emulsion. His conclusions agree with that of bone transplantation—the periosteal emulsion made from the periosteum of the same individual acts best, but the periosteum of any living or recently dead animal may be employed. This periosteal emulsion will keep for a certain length of time; temporary immersion in 5 per cent. carbolic

<sup>1</sup> PROGRESSIVE MEDICINE, December, 1906, p. 177.

<sup>2</sup> Ibid., 1907, p. 151.

<sup>3</sup> Loc. cit.

<sup>4</sup> Annals of Surgery, 1910, vol. lii, p. 403.

<sup>5</sup> Deutsche Zeitschr. f. Chir., 1907, vol. xci, p. 143.

<sup>6</sup> Ibid., 1911, vol. cix, p. 595.

<sup>7</sup> Beitr. z. klin. Chir., 1903, vol. lxiii, p. 235.

acid does not always destroy the cells. The best results are obtained when the periosteum is employed fresh. It is cut up into very small pieces, suspended in salt solution, and injected after the same manner as fresh blood. It may have two effects—mechanical stimulation on the bone cells present and the introduction of new living bone cells.

**Formalin.** Meisenbach,<sup>1</sup> after an experimental study in regard to the mechanical and chemical forms of bone stimulation, concludes that the chemical, on the whole, is better, and that formalin has the most intense action.

**Ivory Pegs.** Amrein,<sup>2</sup> in the first place, gives an historical review, then the technique. The pegs can be boiled and then placed in 1 to 1000 bichloride. They are driven, first, through one fragment and then through the other. The pegs are placed quite close together. The diameter of the peg is from 6 to 10 mm.; the length varies with the thickness of the bone—from 4 to 8 cm. After the bones are fixed with the ivory pegs the periosteum is always sutured. He reports 19 cases. There is a previous report on this subject by Birchner.<sup>3</sup> I have been unable to find any advantage of the ivory peg over the screw.

**Periosteal Bone Flaps.** I have previously discussed Glinsky's<sup>4</sup> report of the method employed in Müller's clinic. Sarantis-Papdoupoulos<sup>5</sup> reports his experience with congenital pseudarthroses, in the treatment of which he employs this bone-periosteum flap. A. Codivilla<sup>6</sup> also employs a pedunculated bone flap whenever possible.

Codivilla's experience with pseudarthrosis seems to be very extensive, and he summarizes his conclusions in a very clear manner, as follows: In thyroid insufficiency, syphilis, osteomalacia, and other like conditions in which the osteogenetic insufficiency is part of a general process, or due to influences outside of the bone cells, medical treatment is indicated.

In all other types of pseudarthroses, the problem is one of surgical orthopedics. The treatment is influenced by two factors—the mechanical condition surrounding the pseudarthrosis, and the osteogenetic activity of the cells. When the mechanical conditions are good, one must attempt to improve the osteogenetic activity of the cells, first, by simple means, such as hyperemia, injections of blood, and increasing the functional activity by walking apparatus. When the mechanical obstacles are present—an x-ray will show this—operation is indicated. In the first place, by the simplest means and with the least injury to periosteum and bone, the scar tissue must be excised and the bone brought into perfect apposition. The chances of bone union in such cases

<sup>1</sup> American Journal of Orthopedic Surgery, 1910, vol. viii.

<sup>2</sup> Centralbl. f. Chir., 1911, vol. xxxviii, p. 440.

<sup>3</sup> Ibid., 1908, vol. xxxv, p. 256.

<sup>4</sup> PROGRESSIVE MEDICINE, December, 1906, p. 179.

<sup>5</sup> Centralbl. f. Chir., vol. xxxvii, p. 431.

<sup>6</sup> Archiv f. klin. Chir., 1910, vol. xcii, p. 452.

can be increased by periosteal flap, or by bone-periosteum flaps, pedunculated or free, or pegs of bone and periosteum. When there is a defect, it must be filled with a bone-periosteum flap or bone transplantation, the details of which we will take up under bone transplantation.

**Adrenalin.** Carnot and Slavu<sup>1</sup> report upon the employment of adrenalin and its effect upon ossification. We shall need further confirming experimental evidence before any conclusions can be drawn.

Morel<sup>2</sup> is of the opinion that the effect of thyroid extract in delayed union is due to the presence of the parathyroids in the emulsion. The article is an extensive one, with the literature.<sup>3</sup>

**Splenectomy.** Allen B. Kanavel,<sup>4</sup> in a series of experimental work, is of the opinion that splenectomy impairs the osteogenetic powers of the bones in a certain degree. It apparently affects the enosteal cell more than the periosteal. The effect is probably part of a general influence on the entire system due to the removal of the spleen.

### BONE TUMORS

The following table illustrates the relative frequency of the different types of bone tumors:

Benign tumors:	
Exostoses . . . . .	34
Other solid tumors: Osteomas, fibromas, myxomas, enchondromas, etc. . . . .	6
Bone cysts . . . . .	20
	— 60
Giant-cell tumors:	
Periosteal . . . . .	3
Medullary . . . . .	19
	— 22
Less malignant tumors:	
Periosteal osteosarcoma . . . . .	3
Myxochondrosarcoma . . . . .	4
Fibrosarcoma . . . . .	1
	— 8
Most malignant tumors:	
Spindle and round-cell sarcoma: . . . . .	
Periosteal . . . . .	14
Medullary . . . . .	13
	— 27
Angiosarcoma:	
Periosteal . . . . .	3
Medullary . . . . .	2
	— 5
	— 32
Sarcoma, clinical diagnosis only . . . . .	18
Multiple myeloma . . . . .	1
Metastatic carcinoma . . . . .	13
	—
Total . . . . .	154

<sup>1</sup> Centralbl. f. Chir., 1910, vol. xxxvii, p. 989.

<sup>2</sup> Ibid., p. 990.

<sup>3</sup> Archives générales de Chir., March 25, 1910.

<sup>4</sup> Surgery, Gynecology, and Obstetrics, 1910, vol. xi, p. 446.



The discussion of this subject in *PROGRESSIVE MEDICINE*, beginning in 1899, has been complete, and recent literature and my own experience will add very little to it, except in regard to the transplantation of bone after resection.

**Exostosis.** The most interesting feature here is to distinguish the exostosis, the traumatic ossifying periostitis, and the syphilitic ossifying periostitis from periosteal sarcoma. During the last two years I have had two examples of traumatic ossifying periostitis and two of the syphilitic ossifying periostitis which were looked upon by others as sarcoma, and amputation was advised. The features in the *x*-ray plate in the traumatic cases, and the positive Wassermann in the luetic patients, allow a pretty positive differential diagnosis which was confirmed by an exploratory incision with the removal of a piece of tissue for diagnosis.

**Myxoma of Bone.** The case of pure myxoma which I reported in *PROGRESSIVE MEDICINE*<sup>1</sup> still remains well. In studying the literature<sup>2</sup> of bone cysts, I was able to collect 5 cases of pure myxoma of bone with or without cysts, cases reported by Baer, Dreesmann, Blake, Codman, and Bostroem. The cysts in all of these cases were situated in the phalangeal bone.

**Benign Bone Cysts.** In the paper<sup>3</sup> presented to the American Surgical Association in 1910, I was able to collect 89 cases classified as bone cysts; of these, 22 I had studied either clinically or pathologically. Of these 89 cases, 69 were true medullary cysts, all of which had a definite relation to the disease *ostitis fibrosa*. I classified these 69 cases into the following types:

1. Medullary cysts in which the bone shell has no definite connective-tissue lining (16 cases).

Here, in the gross, there is nothing but the blood-stained fluid contents and the bone shell. A microscopic study, however, of the bone shell shows, in the Haversian system between the bone lamellæ, a newgrowth of connective tissue—*ostitis fibrosa*.

2. In this group (22 cases), the bone shell and the fluid contents are identical with that observed in the first group, but, in addition, the bone shell is covered with a definite connective-tissue lining which can be peeled off from the bone. The histology of this connective tissue is identical with that found in the Haversian canals of the bone shell.

3. In this group there are but 6 cases. Here the only difference is a smaller cavity and a thicker connective-tissue wall to the shell of bone.

<sup>1</sup> December, 1906, p. 223, Fig. 19.

<sup>2</sup> Transactions of the American Surgical Association, 1910; *Annals of Surgery*, August, 1910.

<sup>3</sup> *Ibid.*

4. In this group (7 cases) there are no cysts, but the bone is expanded and filled with new fibrous tissue, microscopically identical with that in the previous three groups.

5. In this group (5 cases) the cysts are multiple; the partitions between the cysts are composed of the same fibrous tissue—ostitis fibrosa.

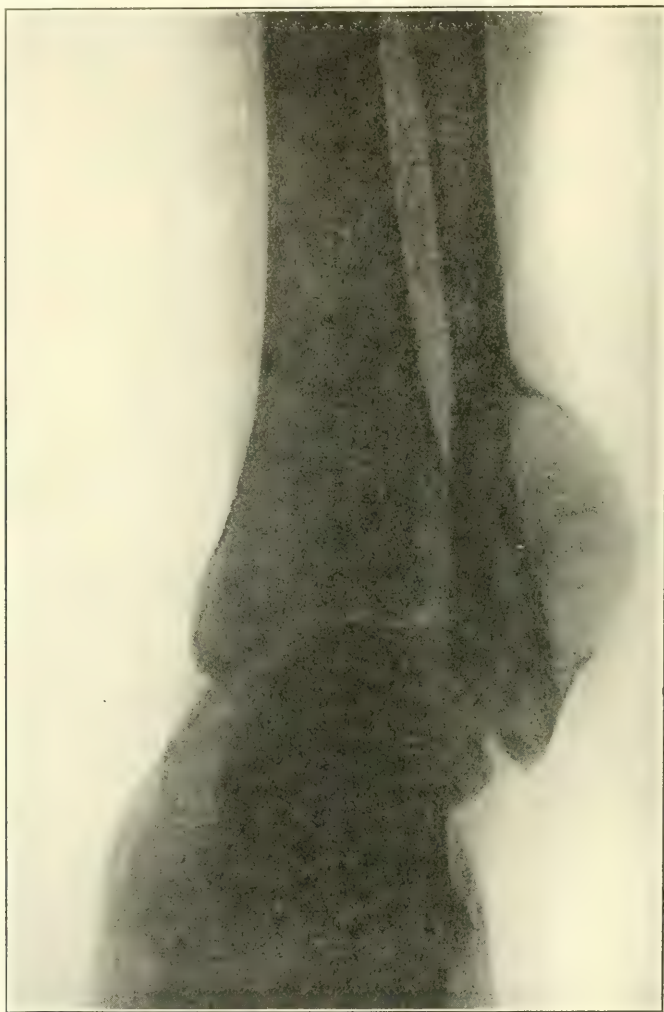


FIG. 30.—Benign bone cyst of fibula.

6. In this group I placed some miscellaneous cases; an infected cyst, 5 cases in which there were *x*-ray studies only; 3 autopsy specimens; 2 healed bone cysts, in which the cavity in the expanded bone had been completely filled with new cancellous bone. There was also one cyst in infantile scurvy.

In all of the cysts there may be found islands of cartilage or giant-celled areas. In previous numbers of *PROGRESSIVE MEDICINE* I have given an example with illustrations of each type.

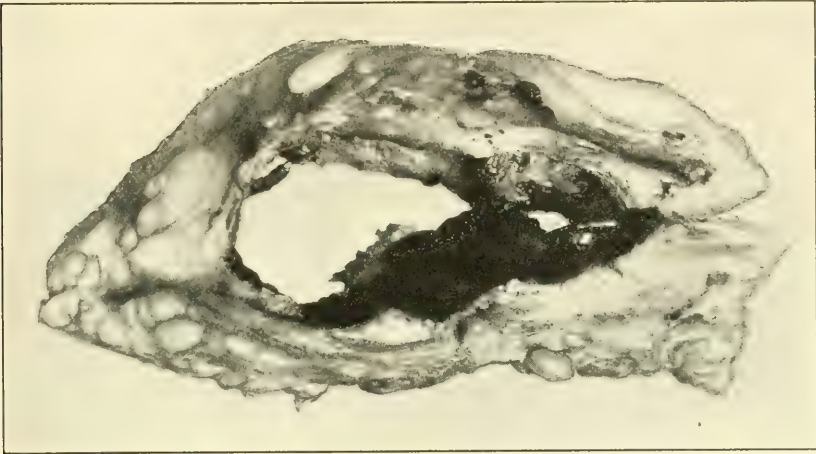


FIG. 31.—Benign bone cyst.



FIG. 32



The remaining 20 cases reported in the literature as bone cysts are not associated with the disease *ostitis fibrosa*. Four are cysts in *enchondromas*, 5 are pure *myxomas* with or without cysts, 4 are cysts in *giant-celled sarcoma*, 4 are cavity formations in *arthritis deformans*, or *ostitis deformans*, 2 are cysts in an ossified *subperiosteal hematoma*, one is a *callus cyst*. In this article I give reference to the entire literature up until 1910, and conclude that the evidence favors that these bone cysts are the result of an inflammatory process.

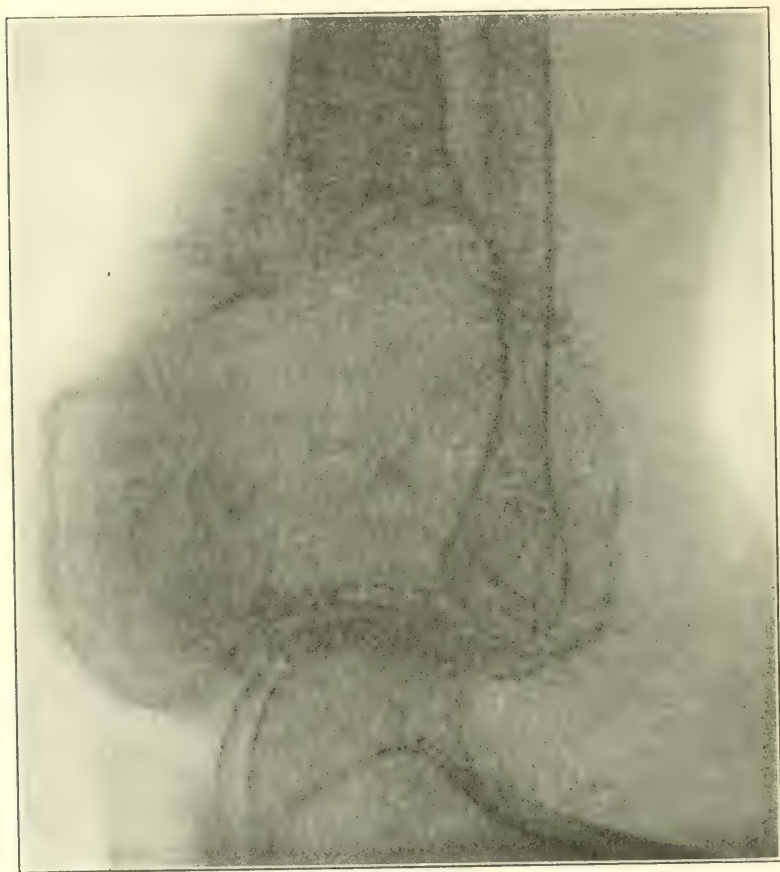


FIG. 33

Since then there have been a few new communications on the subject, but not enough to warrant discussion.

Fig. 30 is an *x-ray* of my most recent observation of a bone cyst, and Fig. 31 a photograph of the cyst which was excised without destroying the continuity of the fibula. It was interesting that after a complete study of the literature (some 89 cases) and a personal experience with about 22 cases, the first new case should be peculiar in appearing more

like a pure myxomatous exostosis.<sup>1</sup> This patient was a girl, aged nineteen years, with pain and swelling of eleven months' duration. The result since operation has been perfect.



FIG. 34.—Giant-celled sarcoma of bone.

**Giant-celled Sarcoma.** In the same paper, presented before the American Surgical Association, I also reported my experience with giant-celled sarcoma and its conservative treatment. This subject has been given considerable attention in my previous discussions in this journal. Hotchkiss<sup>2</sup> reports a resection for a giant-celled sarcoma of the tibia. Jens Schou<sup>3</sup> reports a local recurrence after curetting and x-ray treatment of a giant-celled sarcoma of the lower end of the ulna, but the patient is well with good function three years after resection of the tumor with the lower third of the ulna. In my paper I called attention to the importance of using a strong disinfectant after curetting giant-celled sarcomas. I have always employed pure carbolic acid followed by

<sup>1</sup> Compare with Fig. 19, p. 223, *PROGRESSIVE MEDICINE*, December, 1906.

<sup>2</sup> *Annals of Surgery*, 1911, vol. liv, p. 272.

<sup>3</sup> *Centralbl. f. Chir.*, 1911, vol. xxxviii, p. 230.

alcohol. In all of the cases which I have collected personally among my colleagues, when there was local recurrence, no such disinfectant had been used. Personally I had no recurrences. Gangolphe,<sup>1</sup> a French surgeon, discusses the conservative treatment of sarcoma of bone. Mallory<sup>2</sup> gives a most interesting investigation of the cellular pathology of giant-celled sarcoma.

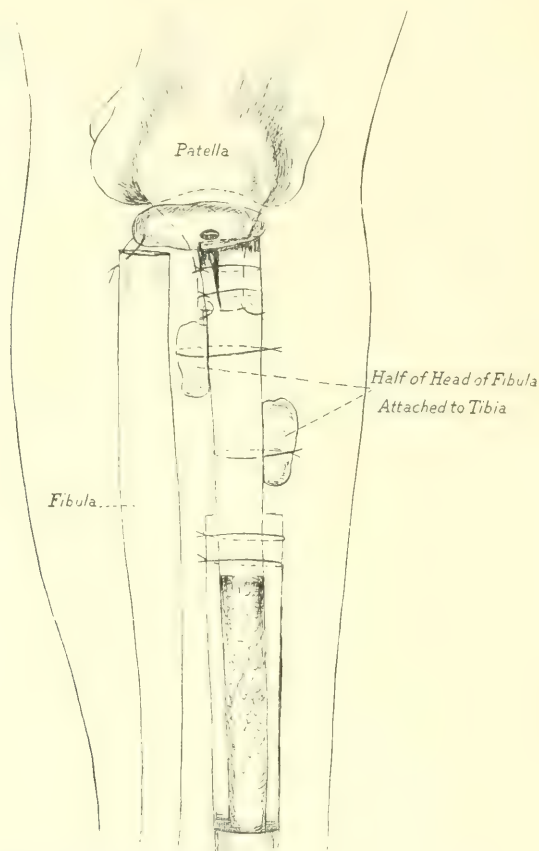


FIG. 35.—Giant-celled sarcoma of bone.

A recent observation of my own illustrates the possible extent of resection when giant-celled sarcoma had advanced far as a local growth, and the beautiful result after bone transplantation, the technique of which I discussed in my contribution to *PROGRESSIVE MEDICINE* in December last year. Fig. 32 shows the patient, a girl, aged twenty-five years, the swelling of some three years' duration; the swelling did not

<sup>1</sup> Lyon Chir., 1909, vol. ii, pp. 523 and 717.

<sup>2</sup> Journal of Medical Research, 1911, vol. xxiv, p. 463.



pulsate, as sometimes happens in giant-celled sarcoma. Upon palpation, the bone shell was absent in a few places. The *x*-ray (Fig. 33) is almost sufficiently characteristic to allow of a positive diagnosis. I first resected this tumor, removing the upper third of the tibia with the joint cartilage, and closed the wound. The tumor is shown in Fig. 34. Some three weeks later I sawed the tibia longitudinally, removed one-half, and with this piece elongated the tibia, so it was the same length as the fibula after I had removed the head of the fibula. I sawed off the articular half of the patella and nailed this piece to the ends of the tibia and fibula to act as a joint surface. I sawed the head of the fibula into two pieces and fixed them on each side of the transplanted piece of tibia. The method of transplantation is shown in Fig. 35, a sketch from an *x*-ray. The wound healed per primam. The patient now walks with some motion at the knee-joint, but still wears a light supporting apparatus, because at the operation all the lateral support of the knee-joint had to be removed. Apparently a new knee-joint capsule and ligaments are forming, because each month the lateral motion in the knee-joint is less, while the flexion and extension are increasing. During the last year I have had six successful cases of bone transplantation. This one was the most extensive.

## SURGERY OF THE LYMPH GLANDS

**Tubercular Lymphadenitis.** Clinically, one should be able to distinguish tubercular lymphadenitis from the pyogenic, at least in the acute cases. In tuberculosis we are often unable to demonstrate the portal of entrance. During the last two years, among at least sixty tonsils sent to the surgical pathological laboratory of the Johns Hopkins Hospital for examination, we found tuberculosis in but one case. It seems possible that tubercular infection may enter through the tonsillar or some other lesion in the mouth and not produce a tubercular inflammatory tissue at this focus. In children with enlarged tonsils and adenoids, the lymph glands of the neck frequently become large during the acute tonsillitis or pharyngitis and do not subside after the acute inflammatory symptoms at the portal of entrance. As a rule, in the majority of these cases, the swelling of the lymph glands disappears after the proper removal of the tonsils, the adenoids, or both. In a few cases which I have observed, in which the lymphadenitis has not disappeared, the glands removed at a later operation were tubercular. In two of my own cases the previously removed hypertrophied tonsils were the seat of a non-tubercular inflammation, while the glands removed later had the histological picture of tuberculosis.

The appearance, therefore, of enlarged glands in the neck in children should lead to a careful examination for adenoids, enlarged tonsil, or

other inflammatory lesions of the nose, pharynx, or ear. These should be treated first. Now, if the glands do not subside under hygienic treatment, operation is indicated.

In chronically enlarged glands in the axilla and groin, one should look for a tubercular lesion in the skin of the extremity. It is not uncommon to find it, especially in the skin of the foot. Both primary and secondary foci should be excised.

It is not necessary to radically remove all tubercular glands. If the patient, under hygienic treatment, is gaining weight, and with this the glands are getting smaller and harder and none show signs of suppuration, operation may be postponed.

If there are any local signs of suppuration, it is distinctly the better plan to operate. A clean dissection, with the removal of tubercular lymphadenitis, if done at all, should, if possible, be performed before suppuration has broken through the capsule of the glands.

Large glands, single or multiple, which do not disappear under proper hygienic treatment should be excised.

There are many problems in the treatment of tubercular glands which are of great interest and which are not yet settled.

We do not know what the result will be when enlarged tonsils and adenoids receive earlier and more radical treatment. As a preventive measure, undoubtedly good dentistry is an important factor. In a word, we should search more frequently for the primary focus and by more prompt treatment of oral, nasal, and auricular infection, we may reduce the number of cases of tubercular lymphadenitis of the neck. When the glands have become enlarged, a better hygienic treatment at an earlier period may effect a cure.

There is no contraindication to the complete dissection of enlarged lymph glands of the neck, except the scar. Between the scar of an operation and one of suppurating glands, the former is preferable. There are recent technical methods which reduce the scars to a minimum, but the result is never as satisfactory as the subsidence of the tubercular lymphadenitis under hygienic treatment.

When, however, the surgeon does operate for tubercular lymphadenitis, the dissection should be complete and clean. If there must be a scar, let the operation be so radical that at least in that area there will be no recurrence of the disease.

**Lymphangiectasia (Elephantiasis).** The primary lesion in elephantiasis is a blocking of the lymphatic vessels. This may be due to a congenital defect, to a parasite (filaria), or to injury or disease. Inflammatory processes and newgrowths are the diseases which block the lymphatics. The most common form of injury is operative complete dissection of the lymph glands. Elephantiasis is observed chiefly on the extremities, scrotum, or vulva. Secondary to the obstruction of the lymph vessels, with their resultant dilatation, there is edema. This

congestion leads to an inflammatory reaction, with the production of new tissue. The skin shows the effect of stasis in papillary overgrowth, vesicles, frequently a chylous or lymph weeping, and ulceration.

**CONGENITAL ELEPHANTIASIS.** Albrecht<sup>1</sup> describes a typical case. There had been swelling of the right thigh and groin since childhood, with warty, vesicular epidermal changes on the thigh. At puberty the swellings increased, and there was a discharge of milky fluid from the warty, vesicular epidermis. In his case the dilatation was progressive, extending to the lymphatics of the abdominal cavity and chest. The characteristic clinical features are the compressibility of the swelling, the increase in size after exercise and standing, and the peculiar changes in the epidermis.

Reiss<sup>2</sup> describes a similar case confined entirely to the vulva. The discharge resembled chyle. When so localized, the condition is called *lymphangioma circumscriptum*. I have observed such a case confined to the region of the groin and cured by complete excision.

Gross<sup>3</sup> reviews the entire literature of *adenolymphocele* or *congenital elephantiasis*. The onset of the disease is usually observed at puberty. The first swellings are noted in the groin. The disease is usually progressive.

In Dr. Halsted's clinic there is a record of congenital elephantiasis involving the entire upper left extremity and axilla in a child, aged two and one-half years. The swellings had been observed at birth and had gradually increased. The child was admitted critically ill with a streptococcus infection secondary to an exploratory incision. The child recovered after amputation of the shoulder.

It appears to me that the early recognition of this congenital type of elephantiasis might develop a treatment which would prevent its progress to a fatal state.

In all cases of acquired elephantiasis one should search for the filaria.

The common types of elephantiasis met with clinically are the swelling of the arm after operations for cancer of the breast and other dissections of the axillary glands. These are usually moderate, give very little discomfort, and gradually correct themselves spontaneously. The elephantiasis of the arm associated with inoperable cancer of the breast, primary or recurrent, may be a very distressing complication, and this condition adds to the discomfort and distress of the last few months of the lives of such patients. It is my experience that these individuals would be given comfort at least, either by amputation, or by Handley's method, which will be discussed later.

In my experience, the elephantiasis of the leg or of the scrotum follow-

<sup>1</sup> Deutsche Zeitschr. f. Chir., 1907, vol. lxxxvi, p. 299.

<sup>2</sup> Archiv f. Derm. u. Syph., Band lxxxvii, Heft 2.

<sup>3</sup> Archiv f. klin. Chir., 1905, vol. lxxvi, p. 778, and *ibid.*, 1906, vol. lxxix, pp. 228, 323, 792, and 963.



ing complete excision of the glands of the groin is never excessive, and in the few cases which I have observed there has been spontaneous recovery.

In leg ulcers, some of the swelling of the leg may be due to elephantiasis secondary to the blocking of the lymphatics due to an obliterative lymphangitis.

TREATMENT. We may recognize, to a certain extent, surgically, a *preventive treatment*. In a properly performed operation for cancer of the breast which plans to leave a good fornix in the axilla and a soft scar not producing contraction, the swelling of the arm never gives the patient much discomfort and needs no treatment except exercise and massage. In my experience, the marked swelling of the arm after operation for cancer of the breast has always been associated with recurrence of the cancer, the more moderate cases to a bad scar, due to some fault in surgical technique.

Complete excision of the glands of the groin should not be performed, except for tuberculosis and newgrowth. If the dissection is unilateral, the swelling of the leg can easily be controlled by proper bandaging and massage. If the bilateral dissection must be performed, as in cancer of the penis, a certain amount of elephantiasis of the scrotum will always take place. This can be controlled by a proper suspensory bandage. During the height of the disease the patient must be instructed in regard to frequent cleansing of the skin with soap and water and keeping the parts dry with toilet powder. In a few cases, infection may indicate partial excision of the swollen scrotal tissue. All of the cases of elephantiasis of the scrotum which I have observed and which have been properly treated have gradually returned to normal. The average duration of the disease is about one year. On one occasion I was compelled to excise a huge mass of scrotal elephantiasis; here the lesion had been aggravated by infection due to uncleanness.

For elephantiasis, therefore, of the arm, leg, or scrotum due to excision of the glands, or some form of non-malignant disease, the prognosis is good with simple treatment. This consists in massage. The lower extremities should be bandaged, and the patient cautioned not to remain standing too long. The sitting position also must not be maintained for too long a period. These patients should be instructed to quite frequently change the position from standing to sitting and the reverse. In the upper extremity rest increases the swelling, while moderate exercise decreases it. Yet I find the majority of these patients are usually instructed by their physicians not to use the arm. Massage is helpful, but not essential. If the patients can afford it, massage shortens the period of partial disability. Daily hot baths undoubtedly hasten collateral circulation and relieve discomfort. When there is weeping of the skin, and when the vesicular, papillary hypertrophy of the epidermis appears, there must be a protective dressing, associated with

unusual cleanliness, to prevent secondary infection, which always aggravates the condition, besides being dangerous to life. The appearance of these epidermal changes, especially in cases which are under proper treatment, should be looked upon as an indication for operative intervention. But if the patients have not previously had the treatment just outlined, it should be tried first.

**OPERATIVE TREATMENT.** Handley<sup>1</sup> proposes a method which is called *lymphangioplasty*. The technique consists in burying long strands of silk in the subcutaneous tissue on the theory that about this unabsorbable material a permanent conduit will be established which will allow the return into the general circulation of the accumulated fluid in elephantiasis. Handley has reported results which were most satisfactory in cases of extreme edema of the arm associated with inoperable cancer of the breast. Draudt<sup>2</sup> confirms Handley's results from experience in Lexer's clinic in Königsberg. His case was an example of elephantiasis of the lower extremity secondary to blocking of the lymphatics after erysipelas. The circumference of the limb in eight days showed a reduction of 30 cm. W. Clarke, of St. Bartholomew's Hospital, in London, reports 2 successful cases, one in the lower and one in the upper extremity.

The technique consists in making small incisions and then carrying the thick silk subcutaneously from one incision to the other with a long blunt probe provided with an eye. The technique, therefore, is very simple, and the results indicate that this method should be given a trial in every case.

Other operative methods are more extensive. Friedel<sup>3</sup> proposes a method for those cases of elephantiasis of the lower extremity associated with varicose veins and ulcers. The principle follows somewhat Schede's older method. Instead of a single circular incision, Friedel makes a spiral incision from ankle to knee and then cuts out along the line of this incision a ribbon-like piece. The disfigurement of this operation is quite great as compared with Handley's method.

**Lymphangioma.** This lesion differs from elephantiasis only in its extent. It is a circumscribed area of dilated lymph vessels. In a few cases there are epidermal changes similar to those observed in elephantiasis (*lymphangioma circumscriptum*).

The case observed by Reiss<sup>4</sup> belongs to this type.

Lymphangioma as compared with hemangioma is a rare tumor. I have records of but 9 cases. It is most commonly situated on the upper lip (*macrocheilia*), less frequently on the lower lip and tongue (*macro glossia*). It may occur as a small epidermal or submucous tumor

<sup>1</sup> British Medical Journal, April 9 and 16, 1910.

<sup>2</sup> Centralbl. f. Chir., 1909, vol. xxxvi, Supplement No. 31, p. 115.

<sup>3</sup> Archiv f. klin. Chir., 1908, vol. lxxvi, p. 143.

<sup>4</sup> Loc. cit.

everywhere. These tumors may calcify and the proliferating endothelial cells of the lymph vessels may give rise to a histological picture resembling sarcoma.

The smaller tumors can be excised, but when excision would result in a mutilating scar, the conservative treatment with liquid air or carbon dioxide snow should be followed. The reported results in large groups of hemangioma make me feel confident that we may expect equally good results in lymphangioma, especially of the lip and tongue where excision and cautery have not obtained ideal results.

**Lymph Cysts.** Cystic tumors may appear on the lower extremity, most frequently in the region of the groin, and in the neck, usually in the supraclavicular fossa. These cysts have a clear fluid, the inner wall is smooth, there may be small pinhead excrescences, the outer wall varies in thickness according to the etiological factor.

The *treatment* of such cysts is excision, if this can be accomplished without injury to neighboring important structures; if not, partial excision and drainage. At the exploratory incision one must be able to differentiate the lymph cysts from the blood cysts. For this reason the cystic tumor should not be opened until it is aspirated. If the contents are hemorrhagic and the walls thin, the probabilities are that the cyst has communication with some large vein. Therefore, the cyst should not be opened at once on account of the danger of hemorrhage, but should be dissected until its communication with the large vein is found and closed by suture or ligature.<sup>1</sup>

The thick-walled blood cyst, in my experience, has been a malignant tumor—an endothelioma arising in the wall of a benign lymph cyst.<sup>2</sup>

In the neck, the lymph cyst is usually of congenital origin; it is observed early in life; the cysts are often multiple, the wall is thin, the contents clear serum. In one of my own cases a child, aged two years, both lymph and epithelial atheromatous cysts were present. If excision cannot be done quickly and without danger to the important structures of the neck, drainage will accomplish a cure after a longer period of wound healing. The entire subject of lymph cysts of the neck is fully considered by Nast-Kolb.<sup>3</sup> The lymph cyst may be of traumatic origin. A large lymph vessel is torn, the accumulated fluid is soon encapsulated by a definite cyst wall lined with endothelium.<sup>4</sup>

The cyst may be due to a closed-off hernial sac, or a healed tubercular abscess. These are usually situated in the thigh or retroperitoneally.<sup>5</sup>

<sup>1</sup> Bloodgood, *PROGRESSIVE MEDICINE*, December, 1905, p. 257.

<sup>2</sup> Baer's case, *PROGRESSIVE MEDICINE*, December, 1905, p. 254.

<sup>3</sup> Beitr. z. klin. Chir., 1906, vol. lii, p. 275; Paetzold, *ibid.*, vol. li, p. 652.

<sup>4</sup> Nordmann's case, *Deutsche Zeitschr. f. Chir.*, 1899, vol. li, p. 178.

<sup>5</sup> Strehl, *Deutsche Zeitschr. f. Chir.*, 1899, vol. li, p. 178, and Narath, *Archiv f. klin. Chir.*, vol. i, p. 763; Minssen and Weydemann, *Deutsche Zeitschr. f. Chir.*, 1906, vol. lxxxiii, p. 577.



**Lymph Cysts of the Neck Due to Injury of the Thoracic Duct.** This may take place during operation, or from a wound. Very quickly the wound is filled with lymph or chyle, dependent upon the amount of food the patient has taken. The discharge may be a quart in twenty-four hours, and this is associated with rapid loss of flesh and strength. During operations upon the neck in the left supraclavicular fossa, one should bear in mind, and try to avoid injury to, this lymphatic vessel. Quite frequently the injury has been recognized and the vessel ligated during the operation, more often the first suggestion of this complication is a distention of the wound which, when opened, contains the characteristic fluid. If the discharge of lymph is not quickly checked by gauze packing, an operation should be performed and the torn lymph vessel ligated. One is led to the opening by the constant dripping at the point of injury.

The treatment is the same for traumatic injuries as for operative wounds. The most recent contribution to this subject is by De Forest.<sup>1</sup>

**Chylothorax from Injury or Disease of the Thoracic Duct in the Chest.** According to Dietze,<sup>2</sup> who studies an observation of his own and 9 cases from the literature previously reported by Hahn,<sup>3</sup> the diagnosis is made by the character of the aspirated fluid and the rapidity of its reaccumulation with rapid loss of weight. Apparently it is possible to have an injury of the thoracic duct without trauma to other thoracic viscera. The first clinical symptom is dyspnea. The fluid should not be aspirated until the symptoms of dyspnea demand it. If there is not rapid improvement after a few aspirations, Helferich is of the opinion that the best results are obtained by resection as for empyema. In these cases, after resection, the discharge of lymph is decreased at once, due apparently to some change in pressure. George Dock<sup>4</sup> records an observation of both chylothorax and ascites caused by a tumor involving the thoracic duct.

**Chyle Cysts of the Mesentery.** Brinsmade,<sup>5</sup> after tabulating 44 cases, finds that these cysts may occur at any age and may be of any size. Clinically, they present themselves as abdominal tumors with or without symptoms of obstruction. The latter is apparently a rare complication. They are usually situated in the umbilical zone and freely movable. The most common situation is between the layers of the mesentery. They are of two types—the true chyle cysts and the serous cysts. According to Brinsmade, the safest procedure is to suture the mesenteric wall of the cystic tumor to the parietal peritoneum inside and drain. Ayer<sup>6</sup> points out that these cysts may not only be situated

<sup>1</sup> *Annals of Surgery*, November, 1907, vol. xlv, p. 705.

<sup>2</sup> *Deutsche Zeitschr. f. Chir.*, 1904, vol. lxxiii, p. 450.

<sup>3</sup> *Deutsche med. Wochenschr.*, 1899, p. 401.

<sup>4</sup> *American Journal of the Medical Sciences*, November, 1907, vol. cxxxiv, p. 634.

<sup>5</sup> *Annals of Surgery*, 1908, vol. xlviii, p. 565.

<sup>6</sup> *American Journal of the Medical Sciences*, 1906, vol. cxxxi, p. 89.

in the mesentery between its folds, but are less frequently found in the wall of the intestine itself and extend into the lumen. Moynihan, in 1897, recognized six types of cysts—serous, chylous, hydatid, blood, dermoid, and malignant.

The most recent German article on chylous cysts is by Hintze.<sup>1</sup>

It should always be borne in mind that in operating upon a tumor of the mesentery, whether by incision or excision, there is danger of injury of the mesenteric bloodvessels which may be followed by thrombosis. The latter leads to gangrene of the intestines. For this reason, in some cases, it would be safer to resect the small intestine with the cyst and mesentery and perform anastomosis.

Dr. Ney, the resident surgeon of the Hebrew Hospital, of Baltimore, has recently brought to my attention a serous cyst situated between the folds of the mesentery. It was about 10 by 5 cm. in diameter, and extended to the wall of the small intestine. It has been removed by total resection with the intestine, followed by end-to-end anastomosis. The child, aged about five years, recovered. The cyst presented itself clinically as an abdominal tumor with some symptoms of obstruction.

**Lymphoma.** As Adami states, the terminology of these lymphomatous lesions is appalling.

Little need here be said of primary tumors of the lymphatic glands, with or without association with certain specific blood lesions, because these diseases are hopeless. Yet they must be considered in differential diagnosis.

In the differential diagnosis we are aided by the blood count, which indicates the presence or absence of one of the types of leukemia; the histological examination of a gland removed for diagnosis, the Wassermann reaction, and the tuberculin test.

In the records of the surgical pathological laboratory of the Johns Hopkins Hospital, I find 265 examples of non-tubercular inflammatory lesions of the lymph glands. Of these, 61 were gonorrheal and 68 chancroidal. There were 588 cases of tuberculosis; of these, 444 were situated in the neck, 63 in the axilla, and 76 in the groin.

It is in this group of lymphadenitis that treatment, conservative or operative, has a definite place. The problems have been discussed.

The remaining 66 cases are equally divided between Hodgkin's disease and some form of sarcoma of the lymph glands.

**Hodgkin's Disease.** The only accurate method of diagnosis is a microscopic examination of an excised gland. The characteristic histological picture so emphasized by the work of Dorothy Reed<sup>2</sup> will allow a positive differentiation of Hodgkin's from other lesions of lymphoid tissue. It should be remembered that it is not infrequent

<sup>1</sup> Archiv f. klin. Chir., 1910, vol. xci, p. 543.

<sup>2</sup> Johns Hopkins Hospital Reports, No. 10, 1902, p. 133.

to find tuberculosis and Hodgkin's in different glands of the same individual. It is often difficult to estimate which is the primary lesion.

I have carefully investigated the ultimate results in these 33 cases, and find that the average duration of life from the symptom of onset is about five years. The longest period is ten years. Children live longer than adults. In this group I have observed the glands to disappear without treatment and to reappear again.

I can find no evidence that the x-rays have accomplished a cure. Vaccines made from the glands have as yet proved ineffectual.

The method of treatment today consists in a hygienic out-of-door life combined with the administration of some form of arsenic.

In my experience, complete extirpation of the glands when they have reached a sufficient size to produce deformity or give discomfort has no effect upon the progress of the disease, but undoubtedly gives sufficient comfort to justify the palliative measure, especially in the early stages of the disease, when the patient is in good general condition without secondary anemia, and may have five or more years of life.

**Sarcoma.** This disease also can only be recognized by a microscopic examination of an excised gland. In the early stages, whether there be an enlargement of one or many glands, the differential diagnosis between the curable and incurable forms can only be made in this way. It is important, therefore, from the standpoint of treatment in the curable type, and prognosis in the hopeless.

One should bear in mind that cases with Hodgkin's disease may react to tuberculin, because tuberculosis of the lymph glands or lungs may be present.

A Wassermann reaction is not a positive indication of the syphilitic granulomata. One of my most malignant examples of lymphosarcoma gave the Wassermann reaction.

In the neck, multiple nodules may be due to aberrant thyroid tissue. The importance, therefore, of the excision of one gland for diagnosis is clearly shown by this fact.

It seems unnecessary to describe in any detail the different types of malignant lymphatic tumors.

There is, first, a group in which there is multiple lymph gland enlargement. Microscopically, these tumors are lymphosarcomas. In some of these cases there is enlargement of the spleen; in others, not. The duration of life varies from nine months to two years.

The single tumors are of two types—the lymphosarcoma and a sarcoma of the fixed connective-tissue cells, round or spindle. The latter may arise from the stroma of the gland or from the tissues in the neighborhood of the lymphatic glands. Then we meet with rare metastatic lymph-gland tumors in which the cell found in the lymph glands is evidently from some other lesion—epithelial or endothelial. Most of these cases are observed in the neck. They present themselves often



with bilateral enlargement of the glands of the neck, and before death a nasopharyngeal tumor develops.

**Chloroma.** I have had no experience with this lesion. Adami describes it as a multiple tumor situated near the bones of the face, skull, vertebrae, and, less frequently, the ribs. Histologically, they are lymphoid overgrowths with reticulum. In the gross, their appearance is striking because of the greenish-yellow tint of the tissue. In some cases there may be a co-existing lymph-gland tuberculosis. Adami looks upon it as an aberrant form of myelomatosis.

In 1904, Dock<sup>1</sup> found 36 cases in the literature. In 1906, Pfeiffer<sup>2</sup> was able to study 42 cases, and added one of his own. At that time but one case had been recognized clinically. The average duration of life from the symptom of onset is about six months; the longest, eighteen months.

When the disease presents itself clinically with multiple tumors, anemia, emaciation, and splenic enlargement, it can be differentiated from multiple myeloma by the absence of Bence-Jones bodies in the urine. In many of the cases the symptoms are of the cerebral tumor—exophthalmos, optic neuritis, deafness, swellings in the temporal fossa. In all cases the rapid weakness and anemia indicate a disease in which there is but little hope of recovery. The blood changes resemble those in acute lymphoid leukemia, in a few of myeloid leukemia. The disease, therefore, is looked upon as an atypical form of leukemia characterized by these peculiar multiple tumors.

**Status Lymphaticus.** This term was first employed by Paltauf to describe a condition in which there was a hyperplasia of the thymus and the lymphatic tissue throughout the entire body associated with hypoplasia of the arterial system. In the later stages of the disease only the hypertrophied thymus may persist, and for this reason examination at this period fails to show the association with a general lymphatic hyperplasia.

In the older literature, status lymphaticus is discussed in relation to the causes of death under, or after, anesthesia, but in the last two years the literature on the thymus has steadily increased.

Today the most interesting lesion of the thymus gland is its hypertrophy, and this hypertrophy may lead to death from respiratory obstruction.

It is important, therefore, in children to carefully investigate the mediastinum when there is the slightest evidence of any difficulty in respiration suggesting thymic stridor or asthma. In fact, in all children who are to be subjected to anesthesia, a careful examination should be made for this possible lesion. The history of asthma, or any type of respiratory disturbance, would be suggestive. The only positive signs are the palpation of the thymus above the sternal notch, and in this

<sup>1</sup> Transactions of the Association of American Physicians, 1906, p. 64.

<sup>2</sup> Münch. med. Wochenschr., 1906, No. 39.

palpation one must be able to distinctly palpate the thyroid above, changes in the percussion note of the superior mediastinum; in some cases, auscultation will reveal respiratory sounds associated with compression of the trachea. In all doubtful cases, an x-ray should be made.

In children with evidences of hypertrophy of the thymus, there should be careful measures of prevention, the child should sleep with its head high instead of low, there should be the most careful hygienic measures in regard to every detail of their waking and sleeping life. They should never be exposed to very hot or cold water, every means should be taken to isolate them from infectious diseases, because these diseases are one of the etiological factors of the thymus hyperplasia, and recurrent infections increase the hypertrophy. A Wassermann reaction should always be taken, because, in some cases, the lesion has been associated with congenital syphilis. It is questionable whether there is any value in the use of the x-ray, except for diagnosis.

**OPERATIVE TREATMENT.** When the attacks of thymic stridor and asthma become more frequent and more threatening, something must be done to prevent thymic death. In emergency cases there can be intubation, with or without tracheotomy, and introduction of a tube to the bifurcation of the trachea. This is practically Melzer's method of intratracheal anesthesia. Operation should then be considered upon the thymus itself. It should be exposed by an incision in the neck, and then it can be drawn out of the mediastinum by blunt dissection. Its vascular attachments are insignificant and are all on the upper pole. In some cases it might be necessary to split the sternum longitudinally. A number of successful cases have been reported. It appears to be a safer technique to perform a tracheotomy and anesthetize through a tube extending to below the point of obstruction. In younger individuals, before puberty, a portion of the hypertrophied thymus gland should be left behind, because its complete removal, especially in the very young, will be associated with deleterious effects on the development of the sexual glands.

The most recent contribution to the experimental side is by Nordmann.<sup>1</sup> Hart<sup>2</sup> presents a collective review on thymus hyperplasia.

From all this wealth of experimental and clinical facts we can cull out for practical purposes only the statements which I have made in regard to thymus hypertrophy.

This disease can and should be recognized more frequently. The failure to recognize it clinically is due more to neglect to look for the lesion than the difficulty of demonstrating its presence.

Many cases can be held in check by proper medical treatment. For the more advanced hypertrophies, with their threatening thymic death, surgery now offers a definite cure, with sufficient successful cases to justify intervention before the symptoms become desperate.

<sup>1</sup> *Archiv f. klin. Chir.*, 1910, vol. xcii, p. 946.

<sup>2</sup> *Zentralbl. f. d. Grenzgeb. d. Med. u. Chir.*, 1909, vol. xii, p. 322, etc.





# PRACTICAL THERAPEUTIC REFERENDUM

By H. R. M. LANDIS, M.D.

**Adalin.** Froehlich<sup>1</sup> has employed adalin, a new sedative and hypnotic, in a large number of cases, and says that its action is prompt, safe, and lasting. Adalin is a combination of bromine with diethylacetylurea, and may be obtained in powder or tablet form. He used it in doses of 1 gram; if a second dose was necessary, 0.5 gram was given. It is best given with some warm drink. Froehlich noticed no cumulative action from its use, and there seemed to be no tendency for the drug to lose its effect when taken over long periods of time. He gives the details of the cases in which he used it, and found that it induced sleep when other hypnotics failed.

Scheidemantel<sup>2</sup> believes that adalin is indicated in conditions in which a strong, restful action is desired, and not a strong hypnotic. It thus occupies a place between the group of simple sedatives and that of pure hypnotics.

**Alum.** Boggs,<sup>3</sup> in his large typhoid experience in hospital practice, seeks in every way possible to minimize the skin infection by the most scrupulous care, the skin of each patient being examined daily. In addition to the general measures for keeping the skin dry and smooth, the long rubber gloves worn by the nurse are covered with a mitt of towelling in order to prevent the pulling of the body hairs by the wet rubber. Nevertheless, he has had, during the last ten years, a fairly constant percentage of skin infections, counting all furuncles, abscesses, folliculitis, dermatitis, and bedsores.

To minimize the incidence of these infections, Boggs has used alum baths for the last two years as a routine method of treatment in the wards, and as the results seem encouraging, it is brought to the attention of the profession in the hope that it may prove generally useful. The procedure is very simple and is carried out as follows: One pound (500 gm.) of powdered alum is quickly dissolved in a little hot water and added to the tub during the filling. With the average tub of 450 to 500 liters, this makes approximately a 1 to 1000 solution. The cost is about 4 cents per bath. The patient is bathed in the alum solution just as in ordinary water, and experiences no inconvenience from the presence

<sup>1</sup> Berl. klin. Woch., 1911, xlviii, 18.

<sup>2</sup> Münch. med. Woch., February 21, 1911.

<sup>3</sup> Journal of the American Medical Association, 1910, vol. liv, p. 2124.

of the drug. The only noteworthy changes in the skin are a slight increase in desquamation during convalescence, and a decided diminution in the incidence of skin complications of all sorts (amounting to 50 per cent.), as shown by the tables appended. In these cases the care of the skin is the same in all except for the alum baths. It is not suggested that the alum baths can replace the rigid care of the skin in the ordinary way, but with them the frequency of skin complications may be still further reduced.

**Arsenic.** Very favorable results were obtained by Willige<sup>1</sup> in the treatment of *organic nervous diseases* with arsenic. He gave the arsenic by means of subcutaneous injections, using for this purpose a 1 per cent. solution of arsenous acid. He began with 1 mg. as an initial dose, and gradually increased to 10 mg. After a maximum dose was obtained, this was continued from three to eight days, and then gradually diminished to the minimal dose. The arsenic was then discontinued for fourteen days, and after that period resumed as before. He gives the details of 12 cases of *multiple sclerosis* treated by this method. Nine of these attained a considerable improvement. The improvement at first was mostly general, the patients gaining weight and strength. Following this general improvement there was a marked functional improvement, especially as regards their ability to walk. The best results were observed in *complicated multiple sclerosis without optic atrophy*. No benefit was observed when the optic nerve was already involved. In 5 cases of *polyneuritis* and 12 cases of *neuritis* and *paralysis* of various origins this treatment seemed to effect a marked improvement. No benefit was obtained in one case each of *spastic spinal paralysis*, *paralysis agitans*, *Friedrich's ataxia*, *pseudobulbar paralysis*, *lead poisoning*, and *hemiplegia*. Six out of 10 cases of *tubes* showed a marked improvement in their general condition, and in 4 of these cases the lightning pains, girdle sensations, and gastric crises disappeared. None of these 10 cases, however, improved as regards their objective symptoms. Willige says that these results with arsenic led him to believe that the long continued use of small doses of arsenic has a stimulating action upon nerve tissue.

Gunn and Feetham<sup>2</sup> relate their interesting experiments, from which they draw the following conclusions: Arsenic, whether in the form of sodium arsenite or sodium arsenate, exerts on the red blood cells an action antagonistic to that of certain hemolytic agents. The experiments, therefore, afford additional proof that a protective action on the formed red blood cells against normal or abnormal hemolytic processes may, in part at least, account for the as yet imperfectly explained benefit which results from the medicinal administration of arsenic in blood diseases.

<sup>1</sup> Münch. med. Woch., 1910, lvii, 620.

<sup>2</sup> British Medical Journal, 1911.

That arsenic in the form of Fowler's solution remains the most effective method of treatment of *chorea*, provided that it is given in large doses, is the contention of Hassin and Herschfeld.<sup>1</sup> However, the possibilities of grave complications on the part of the gastro-intestinal tract and nervous system renders this method of treatment inapplicable in many cases. The authors, therefore, made use of Filaloo's modification of Comby's method of treatment. Filaloo, for a child of from four to six years of age, begins with a daily initial dose of 2 c.c. of a 1 to 1000 solution of arsenous acid, increasing the amount by 2 c.c. daily for seven days. He then diminishes the daily dose by 2 c.c., so that the entire course of treatment is over a period of two weeks. For older children the initial dose is 4 c.c., which is increased daily by 4 c.c., and after a week is diminished by the same amount. Hassin and Herschfeld report excellent results with this method of treatment, and claim that large doses of arsenic are much better borne by this method than when Fowler's solution is used. They also think that the by-effects of arsenical treatment can be greatly mitigated by using arsenous acid instead of Fowler's solution.

**Ascitic Fluid.** Risley,<sup>2</sup> in his paper, reports the work done at the Massachusetts General Hospital, under the direction of the Cancer Commission of Harvard University, on the treatment of *inoperable cancer* with the various normal and abnormal body fluids and with cancerous ascitic fluid. Forty-five patients were treated by these injections; most of them were treated with ascitic fluids obtained from patients suffering from cancer. An effort was made to obtain the ascitic fluids from patients resistant to their disease, with the idea that the amount of antibodies in these cases would be larger than in very active or non-resistant cases. A second smaller group of cancer patients was treated with various normal and abnormal body fluids for purposes of control. Finally, untreated patients were observed coincidentally for the purpose of comparison with the treated cases. Risley gives briefly the definite results witnessed in this series of cases. In 5 cases, there was a decrease in or absolute abolition of the pain previously complained of. Increase in pain was experienced in 2 cases. In 3 cases, there was a decided increase in the discharge from an ulcerated surface, and a breaking down of cancerous tissue, considerable portions of which sloughed away entirely—enough to cause a moderate hemorrhage. Moderate increase in discharge from an ulcerated surface has been noticed in practically every patient treated. This, in some cases, was only temporary, but was followed later by a noticeable cleaning-up of the ulcer and more healthy granulations. Cessation of bleeding in several cases of uterine cancer was seen. There was an apparent retardation of the

<sup>1</sup> Medical Record, 1910, vol. lxxviii, p. 15.

<sup>2</sup> Journal of the American Medical Association, February 26, 1911.



growth in 8 cases for periods of from two to five months, and in 3 others for a period of over one month. Twelve patients have remained in excellent general physical condition, gaining strength and weight in spite of a slowly growing process. On the other hand, in no case was there actual shrinking in the size of the tumor, and in 2 cases there seems to have been a decided increase in the rate of the growth of the tumor. In no instance was any marked harm done. A local and constitutional reaction has occurred more often from the injection of the fluids from resistant cases, and this fact seems to indicate that their action is more specific.

After a trial of seven months' duration, with a series of 45 cases, comprising variety enough both in the fluids used and in the type of cancer treated, Risley draws the following conclusions, based on a careful analysis of the results in his series:

1. The various transudates and exudates of the body, cancerous and non-cancerous, have no effect in retarding the growth of cancer in mice.
2. The use of cancerous ascitic fluid from patients in the active or even moderately resistant stages of the disease has no permanent effect in preventing or checking the growths of cancer, or permanently benefiting the cancer patient.
3. The other non-cancerous body fluids are even more inert.
4. Temporary beneficial effects may be noticed for periods of from one to five months, but the course of the disease is in no way permanently retarded.
5. Temporary relief from pain, especially in uterine cases and in other cases in which large doses can be given, and retardation of the growth for periods varying from one to five months, may be expected in a small per cent. of the cases.
6. Noticeable benefit in the general physical condition has resulted in one patient with cancer of the ovary, by the injection of her own fluid.

The result of Weil's<sup>1</sup> experiments with ascitic fluids in cancer have been almost entirely negative in character—that is to say, they have not indicated the existence of any specific characters such as would serve to differentiate with certainty fluids derived from cancerous individuals from those of another origin.

Leary and Hastings<sup>2</sup> state that they have had excellent results in the *treatment of intractable cases of marasmus* in infants by means of ascitic fluid, one ounce being injected daily for a period of varying duration. Twelve such cases are reported.

**Aspirin.** Graham<sup>3</sup> reports a case of *idiosyncrasy to aspirin*, and cites a parallel case published as a communication in the *Journal* of November

<sup>1</sup> *Journal of Medical Research*, Boston, August, 1910.

<sup>2</sup> *Boston Medical and Surgical Journal*, August 18, 1910.

<sup>3</sup> *Journal of the American Medical Association*, January 28, 1911.

19, 1910. Graham's case took 5 grains, and repeated the dose in an hour for relief of a headache. About one hour and a half after taking the first tablet the mucous membranes of the eyes, nose, and mouth became edematous. The eyelids and lips were everted and swollen to twice their normal size. The conjunctivæ, tonsils, uvula, and pharynx were congested, and articulation was difficult. In three days' time most of the signs and symptoms had subsided.

In Buhling's<sup>1</sup> cases, about four hours after the ingestion of 10 grains of acetyl-salicylic acid, the face, particularly the lips and around the eyes, began to redden somewhat and swell, and shortly were so edematous and stiff that it was an effort to move the lips and eyelids. All over the body there was an urticarial eruption, and a hoarseness developed which was due to edema. The maximum effect was reached in about an hour and a half, after which the edema and the eruption gradually receded.

**Atropine.** Schick<sup>2</sup> reports prompt healing in some very serious and obstinate cases of *gastric ulcer* under a systematic course of atropine, and he expatiates on the importance of this too much neglected remedy in internal medicine. The subjective symptoms, especially pain, disappear quickly after beginning treatment. Hyperacidity and hypersecretion were less quickly influenced. Pyloric stenosis due to cicatricial contraction was either not at all or only slightly influenced. Schick agrees with the view of Essinger and Hess that many ulcer cases are dependent upon an increased vagus tone. This increased vagus tone stimulates the gastric secretion as well as the gastric musculature, and can be diminished by the systematic use of atropine. He has found atropine useful also in treatment of spastic constipation, spasmodic asthma, pylorospasm, lead colic, cardiospasm, and gallstone colic. By the relaxation induced by subcutaneous injection of atropine the walls of the ducts allow the stone to pass along or to fall back into the gall-bladder. This treatment might prove useful also in kidney-stone colic. The drug is also useful to differentiate spastic contraction of the stomach from organic retraction of the stomach walls; in several cases of hourglass stomach, Schick noticed various signs indicating extreme excitability on the part of the vagus. If the vagus is abnormally irritable, the drug can be given with confidence up to 0.001 or 0.002 gram per day. In the absence of signs of abnormal excitability of this part of the nervous system, the greatest caution is necessary; active delirium and other serious by-effects may be observed when the exact indications for it are not heeded.

Drenkhahn<sup>3</sup> reports a number of cases of *dysmenorrhea* in which

<sup>1</sup> Quarterly Bulletin of the Northwestern University Medical School, December, 1910.

<sup>2</sup> Wiener klin. Woch., 1910, xxiii, 1229.

<sup>3</sup> Zentralbl. f. Gynäk., Leipsic, xxxiv, No. 47, 1529.

injection into the cervical canal of 1 mg. of atropine dissolved in 1 c.c. of water arrested at once the colic spasms in the uterus or prevented their development. If there is no speculum or syringe at hand, the same effect can be realized by introducing a small cotton wad moistened with a 1 per cent. solution of atropine and pressed far back against the posterior vault of the vagina. This simple measure has proved effectual in his experience of fifteen years. His experience has shown that even a single application of the atropine may cure a chronic tendency to dysmenorrhea when there are no morbid changes in the genital organs. He adds that mild acute and chronic inflammatory conditions in the uterus may yield promptly to sitz baths and other measures when the uterus is under the influence of atropine, when otherwise the affections are refractory to all treatment. He wonders that more attention is not paid to atropine as a means of enforcing rest for the uterus in morbid conditions, and states that his communication is for the purpose of rescuing atropine from the neglect into which it seems to have fallen in respect to the treatment of painful affections of the uterus.

Auer finds that a prophylactic injection of atropine sulphate in guinea-pigs sensitized by the subcutaneous injection of horse-serum saved 18 out of 25 from the lethal effect of the toxic injection; while out of 24 adequate controls, only 6 survived. Stated otherwise, the death rate with atropine was 28 per cent.; without atropine it was 75 per cent. These figures show the distinct therapeutic utility of atropine in immediate *anaphylaxis*.

**Bile.** Inouye and Sato<sup>1</sup> discuss the physiological action of bile as determined by many different observers. They also relate their findings in 15 cases studied by them from a metabolic standpoint, that seem to indicate that the administration of bile in certain conditions is based upon rational therapeutics, consequently they advocate the administration of bile in *jaundice* due to various causes. They say that absorption of fat is increased by its use, and that it also has a laxative effect. They advise giving inspissated ox bile in some sweetened aromatic water, in doses of from 0.5 to 1 grain one hour before meals. The authors say that if it is given with considerable water in this way it will not disturb gastric digestion.

**Bismuth.** The *untoward effects of bismuth* and its salts, causing bismuth poisoning, and nitrite poisoning if the bismuth subnitrate is used in large amounts, especially if putrefaction or fermentation be present, thereby liberating the nitrites, has been dealt with in a previous number of PROGRESSIVE MEDICINE.<sup>2</sup> More recently, Beck<sup>3</sup> has directed attention to the fact that in the course of the last twelve months many instances have been recorded of serious and, occasionally, of fatal results from the use of bismuth paste in the local treatment of suppu-

<sup>1</sup> Arch. f. Verdauungskrank., 1911, xvii, 185.

<sup>2</sup> December, 1909.

<sup>3</sup> Centralbl. f. Chirurgie, No. 17, 1910.



rating cavities and fistulæ. Reich, of Tübingen, has collected 16 cases, with 7 deaths, and of 3 cases recently put on record by Matsnoka, 2 were fatal. The earliest symptoms of the chronic form of poisoning caused by the slow and prolonged absorption of bismuth by a suppurating surface is a pale livid tint of the skin. This is followed by an eruption of small, bluish ulcers on the gums. The further progress of the poisoning is marked by nausea, headache, vomiting, and albuminuria. In advanced cases, the ulceration of the gums increases, and the patient becomes emaciated, and gradually succumbs.

The author, who in his own practice has observed cases of the kind, states that the bad results of the slow absorption of bismuth may be prevented by constantly looking out for the appearance of the early signs of the poisoning, and, if any of these be manifested, by injecting into the cavity still occupied by the bismuth paste some warm and sterilized olive oil, which is allowed to remain for from twelve to twenty-four hours, and until it has formed an emulsion which can be removed by aspiration. The use of bismuth paste, Beck adds, is contraindicated in cases of acute suppuration, particularly empyema, as absorption so readily occurs from the fresh, inner surface of the suppurating area. On the other hand, in old abscess cavities with thick and fibrous walls, with much diminished capacity for absorption, the paste may be applied with but slight risk. The maximum strength of the paste used by the author is 33 per cent. When the secretion becomes sterile, the paste containing this proportion of bismuth is withdrawn, and replaced either by a 10 per cent. paste or by sterilized vaseline.

**Cactus Grandiflorus.** The testimony concerning the therapeutic value of *Cactus grandiflorus* is conflicting, and, indeed, absolutely contradictory, since many observers have stated that they found it to be a most useful cardiac remedy, whereas others have pronounced it absolutely inert. Hatcher and Bailey<sup>1</sup> conducted a series of experiments to ascertain the therapeutic value of this drug, and report that they have been unable to obtain any evidence that the true Mexican cactus *grandiflorus* possesses any pharmacological action whatever, but, on the contrary, it appears to be a singularly inert substance, when administered either by the mouth or by the vein. When colossal doses of *cactus grandiflorus* are given by the vein they sometimes, but not always, appear to exert an extremely feeble action on the heart; but this action is so slight that its nature could not be determined. Even the most colossal doses of the drug administered by mouth to cats, dogs, and frogs exert no perceptible effect. They conclude that if they are correct in maintaining that *cactus grandiflorus* is inert, it hardly requires further proof that any substance extracted from the drug must be inert also.

<sup>1</sup> Journal of the American Medical Association, January 7, 1911,

**Chloretone.** Fiocre<sup>1</sup> was first to describe the unique method of applying chloretone to the mucous membrane of the throat. He takes advantage of the volatile property of chloretone. By the application of heat the crystals become readily liquefied and the vapor can be deposited upon a surface by a current of air. Anderson's<sup>2</sup> attention was called to this method about a year ago, and he has used it successfully in affections of the mucous membranes of the upper respiratory tract. He suggests a simple apparatus for its use in this way. All that is necessary is a glass tube with a spherical bulb at about the centre of the tube. About 10 grains of chloretone are placed in the bulb, the opening in the top is closed by a cork, and heat applied until the crystals melt. An alcohol lamp, an ordinary gas flame, or even a lighted match will supply the necessary heat. While the crystals are in the liquid state a current of air is drawn through the glass tube, and a white vapor of pure chloretone can be deposited upon a surface. Air from a compressed-air apparatus or from an ordinary atomized bulb furnishes the current necessary. As the tube cools, the chloretone will be deposited on the inner surface of the glass. By heating the tube, the deposit can be melted and run back into the bulb, and used again.

Vapor of chloretone deposited upon a surface of mucous membrane forms a white film. Gradually it becomes dissolved by the moisture on the surface of the membrane. At first there is a slight tingling and a suggestion of the taste of camphor, which is soon followed by its anesthetic action.

Chloretone applied in this way to a *tuberculous larynx* will produce in a few minutes an anesthetic effect sufficient to enable a patient to swallow soft food without discomfort. This effect often lasts for hours, and can be repeated several times a day, if necessary. In a similar manner the writer has used chloretone to relieve the pain following *operations upon the throat and in malignant diseases*. Like all similar drugs its effects will wear out in time, but it can be used in increasing frequency without danger of establishing a drug habit or fear of poisonous effects. Its marked germicidal action adds to its value when used locally.

**Climate.** "Climate as a Curative Agent," formed the basis of an interesting paper by Byles.<sup>3</sup> He expresses the belief that the pendulum of professional opinion has swung too far toward the negative end of the arc, and that the influence of climate on health and disease is worthy of more consideration than the leaders of medical thought of the times are inclined to give it.

From a physician's point of view, he tells us there are but two classes of climate, the sedative and the stimulating—the low, warm, moist climate of the seacoast, and the high, cool, dry climate of the interior

<sup>1</sup> La Presse Médicale, July 20, 1907.

<sup>2</sup> Therapeutic Notes, July, 1910.

<sup>3</sup> New York Medical Journal, vol. xcii, No. 27.

mountainous districts. We may take Florida as a type of the one, and Colorado of the other. The climate of places between the coast and the mountains may be classified with either one or the other, according to the preponderance of characteristics of either. The difference in the action and effect of these two classes of climate is as great and as uniform and as opposite as the difference between the effect of bromides and strychnine, so that whatever is said of one class will apply conversely to the other.

Having in mind the physiological action of these two classes of climate, the author suggests a list of diseases or conditions which would call for a residence in one rather than the other of these different climates.

Diseases in which a stimulating climate is usually indicated: Emphysema; unresolved pneumonia; asthma; small, weak heart; functional heart disease; digestive disorders; malaria; anemia; articular rheumatism; moist nasal catarrh; diabetes.

Diseases in which a sedative climate is usually indicated: Emphysema; nervous diseases, except melancholia; aneurysm; atheroma; cardiac dilatation and all organic heart lesions; dry, nasal catarrh; muscular rheumatism; nephritis.

Tuberculous cases benefited by stimulating climate: All cases contracted at elevation should remain, also those inheriting strong tuberculous tendencies; tuberculosis of other structures than the lungs; all incipient cases without persistent high temperature; chronic fibroid cases, when not too far advanced.

Tuberculous cases requiring sedative climate: Acute tuberculosis; all cases with constant high temperature; very far advanced cases with great destruction of lung tissue; cases complicated with other conditions contraindicating elevation, as of the heart or nervous system.

The character and stage of the disease in question, the degree of elevation, and other climatic conditions required, as well as the available sanatoria and other accommodations for the care of the patient, must be taken into consideration. In addition to these general suggestions, one must take into account the age, character, nervous make-up, and financial condition of the patient; in other words, his ability to use and enjoy the advantages of a suited climate away from home, without sacrificing other essentials to recovery obtainable only at home.

Byles concludes by saying: Climates are either stimulating, as Colorado, which is high, dry, cool, and clear; or sedative, as Florida, which is low, moist, warm, and cloudy.

The physiological action of these are opposite, and cases improved by one will be made worse by the other.

The principal characteristics of any climate: Altitude, humidity, temperature, sunlight, character of soil, prevailing winds.

Physiological action of altitude due to less oxygen and less pressure causes increased depth of breathing, increased rate of breathing,



increased chest expansion, increased elimination of carbon dioxide, increased number of red cells, increase in hemoglobin, increase in lymphocytes, increase in cell formation, decreased blood pressure.

Effects all due to effort of nature to compensate for lessened oxygen and lessened atmospheric pressure: Humidity, absolute and relative, depends on distance from ocean, mountain ranges, character of soil, temperature. Dry climate accounts for increased comfort in both summer and winter, increased action of the skin, increased diathermacy, increased sunshine, increased outdoor life, increased germicidal power of air and sunlight.

Sunlight favors metabolism, elimination of waste product, action of nervous system, function of skin, destruction of bacteria, outdoor life.

Prevailing winds do harm when winds are chilling or contain much dust. Character of soil effects humidity, dust storms, drainage, drinking water, mosquitoes, etc.

Nohring<sup>1</sup> has the windows of the halls used for fresh-air treatment closed at night and the heat turned on in the morning, so that the floor and walls never get thoroughly chilled through, although the big windows are all open to the floor during the day while the patients are reclining there. If the day is dry, he has a temperature as low as 32° F. in the halls, but if the weather is damp he does not let the halls get colder than 50° or 52° F. Five years' experience has convinced him that this modification of the vigorous northern climate gives far better ultimate results than attempts to enforce the actual climatic conditions.

**Cocaine.** Several cases of *death after the injection of cocaine into the urethra* in ordinary doses for the production of anesthesia have been recorded. The rules for this procedure, therefore, appear to require revision, or some safer drug should be used. A recent case is recorded by Captain A. D. Jameson, R. A. M. C.<sup>2</sup> A soldier had a urethral fistula secondary to a stricture, three inches distant from the meatus. An attempt was made to dilate the stricture with metal bougies, but it was found to be very sensitive. Four days later another attempt was made to pass a bougie after injecting into the urethra a little of a 10 per cent. solution of cocaine, the urethra being compressed between the finger and thumb behind the stricture. The solution of cocaine was not retained, but allowed to escape when the syringe was removed. After five minutes the stricture was found to be still sensitive, and more cocaine was injected in the same manner. Three minutes later, while the stricture was being dilated, the patient's color was noticed to be very bad, and a convulsion lasting half a minute occurred. The pupils were widely dilated, the pulse was imperceptible, and the

<sup>1</sup> Medizin. Klinik, Berlin, February 12, 1911, vii, No. 7.

<sup>2</sup> Journal of Royal Army Medical Corps, Lancet, July 2, 1910.

forehead was covered with sweat. Artificial respiration was commenced, strychnine and brandy injected, and an electric battery was used, but the patient never rallied. The necropsy showed nothing important except a few cauliflower vegetations on the mitral valve, which, however, acted perfectly. The solution of cocaine had been in use for a fortnight. The amount retained in the urethra must have been very small, as, when the pressure was removed after an injection, its walls came together again and the fluid was expelled.

In Dr. Dixon Mann's *Forensic Medicine*, two cases are quoted of sudden death from injection into the urethra of a dram and 20 minims respectively of a 4 per cent. solution of cocaine. However, these were the only fatal cases in a series of several thousand. In another case recently recorded, death occurred after the injection of 30 minims of a 10 per cent. solution of cocaine. Three cases of dangerous symptoms after the injection of 20 minims of a 10 per cent. solution have also been reported. Most authorities say that a 20 per cent. solution of cocaine may be swabbed on a mucous membrane, and in Caird and Cathcart's *Surgical Handbook* it is stated that 2 drams of a 5 per cent. solution may be injected into the urethra with safety. Captain Jameson refers to another case mentioned to him by a brother officer, in which death followed the introduction of a small amount of a 10 per cent. solution into the urethra to facilitate the use of the urethroscope. But although he has for years been in the habit of applying a 10 per cent. solution of cocaine to mucous membranes for small operations, he has never before seen any toxic effects.

Higier,<sup>1</sup> in his discussion on the *mental disturbance with chronic cocaine poisoning*, comments on the fact that the action and symptoms of a single acute poisoning with cocaine are very different from those of chronic intoxication. The needle punctures leave traces of brown, almost black pigmentation; this is a sign peculiar to cocaine. The parasitias are not located at the periphery, but on the trunk, and they produce the subjective impressions of foreign bodies under the skin. Most characteristic of all is the delirium with hallucinations; it resembles more the alcoholic delirium, but there are no objective signs of liquor drinking. The patient during the delirium can reason logically, and behave normally in regard to surrounding objects, until unconsciousness supervenes, the conditions differing thus from that of ordinary drunkenness. With the cocaine, there is at first an exalted self-consciousness, followed by dyspnea and distress. Further testimony to the cocaine as the cause of the mental disturbances is the favorable influence of morphine; morphine is almost an antidote for cocaine poisoning. Higier adds that the hallucinations may drive the patient to commit suicide, which is an extremely rare occurrence in alcoholic delirium, even the

<sup>1</sup> Münch. med. Woch., March 7, 1911.

most aggressive. Cocaine can be suppressed abruptly, he continues; there is little reaction, while recurrence, he says, is rare. He denounces as false the statement in some of the works on toxicology in regard to habitual cocaine mania, declaring that cocaine addiction is readily curable.

**Diet.** In *PROGRESSIVE MEDICINE* for 1910, I discussed the value of diet in fever, obesity, gout, diabetes, and epilepsy.

Following the careful experimentation by Bolton,<sup>1</sup> the theory with regard to the part played by the gastric juice in the production of gastric ulcer receives further confirmation, because ulceration is the more rapidly produced in proportion as the gastric juice is allowed a longer period of contact with the wall of the stomach. The epithelium grows over the base of an ulcer more rapidly when the animal is given a milk diet than when it is given a meat diet. In the case of a milk diet, the base of a moderate sized ulcer is usually completely covered by the twentieth day, while in the case of a meat diet, the same sized ulcer would, in most cases, be uncovered in the centre in that time. In the treatment of a case of *ulcer of the stomach*, Bolton holds that the following principles should be observed: (a) During the early stages of the healing of acute ulcer the patient should be given a food which does not stay long in the stomach, and which does not excite a copious flow of the gastric juice. (b) The period of treatment in bed should be at least three weeks. (c) The starvation diet of the older physicians is not necessary, because the general nutrition suffers too much, and because ulcers heal well on some diet such as the above. (d) In the case of acute ulcers which are extending, or chronic ulcers, healing cannot be expected in three weeks, because the ulcer must first be got into a suitable condition for healing, and then, owing to its size and thickness, the healing must take some weeks longer to be completed, so the treatment in bed is to be conducted like that of simple acute ulcer, but extended over a period twice as long. (e) Since in many cases of gastric ulcer there is hyperacidity of gastric juice, and, when the gastric juice is acting destructively, hyperacidity increases this destructive tendency, this high degree of acidity should be controlled by the administration of an alkali. This is not necessary in acute ulcer, as in the more chronic forms, because the few estimations that have been made of the gastric secretion in acute ulcer show that it is not hyperacid, and it has been found experimentally that the effect of acute ulcer is to diminish the secretion in the early stages, and that the secretion becomes normal as the ulcer heals.

Kalisch<sup>2</sup> believes that *dietetic measures* are very important in the treatment of *cholelithiasis*. The diet, according to Kolisch, should be so regulated that the liver is spared as much work as possible. Furthermore, it is important to keep the intestines active and free from catar-

<sup>1</sup> British Medical Journal, December 24, 1910.

<sup>2</sup> Med. Klinik, 1910, vi, 531.



rial processes. He believes that intestinal catarrh may cause a similar inflammation in the gall-bladder. He ascribes the benefit derived from the Carlsbad cure to the effect upon the intestines of the Carlsbad waters. Kalisch forbids all highly seasoned foods, very acid foods, raw vegetables and fruits, fat and salted meats, any fat that does not melt readily, and any food that is prepared with yeast or other ferments. The fats that are allowed are oil, cream, and butter. The amount of protein should be limited and given in small portions throughout the day. Care must be taken to avoid protein containing a large amount of extractive or purin bodies. Cold drinks are forbidden, but hot drinks have as favorable an action as hot external applications. Kalisch applies hot fomentations to the abdomen for two hours after dinner every day for two or three months after an acute attack.

Ruhräh<sup>1</sup> advocates the use of the *soy bean as an article of diet for infant feeding and diabetics*, on account of its large percentage of protein. The soy bean, sometimes incorrectly called the soja bean, is a staple food among the Chinese and Japanese, and probably accounts, in part, for the small amount of other nitrogenous food taken by them. Ruhräh thinks that the general and continued use of this bean demonstrates conclusively that the protein of the bean may be utilized in the body in place of that of other vegetables and of meats. The soy bean may be cooked in the form of soups, gruels, and porridges, or may be eaten raw, as a vegetable or salad. As soy beans are not available in most markets, and as their cooking is a tedious process, Ruhräh had a flour manufactured from the bean. The analysis of this flour showed a protein content of 44.64 per cent. The percentage of protein was almost one-third greater than the percentage in the whole beans, due to the removal of the coarse fibrous hulls. Each ounce of this soy gruel flour yields about 13 grams of protein and 120 calories, and it can be used (1) as a gruel, (2) in broths, (3) in making biscuits or muffins. It may also be mixed with cereals, barley, jelly, cream of wheat, and similar foods. Ruhräh gives the method of preparation of gruels, broths, and muffins from this soy-bean flour in his article. He also discusses the indications for its use in difficult infant feeding cases, and believes that the soy-bean flour solves the difficulty of supplying sufficient protein in a form in which it can be digested and assimilated by infants and young children.

Leva<sup>2</sup> gives a review of the literature dealing with the different *indications for a salt-poor diet*. He discusses more particularly the practical application of such a diet, and gives valuable tables showing the salt content of various articles of food, based upon 360 analyses. There are included in his tables many foods poor in salt content that serve to make a liberal mixed diet in cases in which abstention from salt is indicated.

<sup>1</sup> Journal of the American Medical Association, 1910, vol. liv, p. 1664.

<sup>2</sup> Med. Klinik, 1910, vi, 782.

**Digitalis.** Von Leyden<sup>1</sup> urges that digitalis should not be given unless there is urgent need for it, and not to give it too early. It seems to be established that digitalis acts only on the left ventricle; when the right ventricle is weak, digitalis acts injuriously rather than usefully, possibly increasing the dyspnea. Consequently he regards this drug as contraindicated in mitral stenosis, emphysema, and kyphoscoliosis. If its action is favorable under these conditions, it is only on account of the secondary weakness of the left ventricle. He assumes that digitalis acts only on the musculature of the heart, and consequently will have little action if a large part of the muscle is degenerated. With chronic myocarditis, it frequently fails completely. Even with valvular defects its lack of action may be explained by the isolated myocarditic foci accompanying the endocarditic process. He regards the action of digitalis as uncertain and dubious when there is fever, preferring to give 5 to 8 drops twice a day of tincture of strophanthus.

Edens,<sup>2</sup> in discussing *the action of digitalis in arrhythmia*, states that the newer methods of examining the pulse and heart action have only strengthened our confidence in digitalis. When the drug fails to act—which used to be ascribed to impurities in the drug—we know that is because the heart affection is of a kind which is not influenced by digitalis. This very failure is proving a most important aid for diagnosis and prognosis, as he illustrates by a number of case reports and tracings. The chief element in the action of digitalis, possibly, is the promotion of the circulation through the coronaries by the lengthening of the diastole and the better filling of the arterial system. When mechanical obstacles, such as aortic insufficiency, interfere, or when the acceleration of the pulse is the result of nervous influences rather than of insufficiency of the heart muscle, then digitalis is apt to fail. The drug is thus apt to render good service, he asserts, in differentiating the various kinds of extrasystoles and in improving the contracting power of the heart. It may seem to induce a bigeminous rhythm of the entire heart, but under its continued administration the rhythm alters so that the contraction of the auricle occurs simultaneously with that of the ventricle systole, while the interval between the first and second systole persists unmodified. These are the cases described by Hering as “pseudo-alterans,” and Edens has encountered 5 such cases; the digitalis induced bigeminus of the ventricles, while retarding the auricle beat.

According to Schmoll,<sup>3</sup> digitalis acts as a specific on the tonicity of the heart muscle, and is indicated whenever symptoms point to a failure of that function. Its tonic effects are best secured with a dose equal to the amount excreted—about 0.1 gram a day—though doses of 0.15 and 0.2 gram a day sometimes can be taken for weeks without the

<sup>1</sup> Therapie der Gegenwart, Berlin, 1910, li, 11.

<sup>2</sup> Therapeut. Monatshefte, Berlin, January, 1911, xxv, 1.

<sup>3</sup> American Journal of the Medical Sciences, January, 1911.

appearance of cumulative effects. Loss of tonicity is shown first by general symptoms—rales over the bases of the lungs, enlargement of the liver, and slight edema of the ankles. Digitalis is indicated, therefore, whenever these symptoms appear, and especially in cases in which the patient, after recovering from a severe break in compensation, shows a tendency to fail on the slightest exertion.

Dropsy in cases of heart disease, in which the auricles are in a state of "*fibrillation*," and functionally inactive, is present, according to Windle,<sup>1</sup> in a large proportion of cases of severe heart failure, whatever the nature of the underlying lesion may be. He has found the benefit derived from the administration of *digitalis in cases of severe heart failure* variable, even when the classical indications for its use are present. In some patients, improvement is rapid and maintained—the heart decreases in size, the edema quickly disappears, its power for good is limited—improvement occurs to a certain extent, and then comes to a standstill; again, particularly in cases of mitral stenosis with regular pulse and those resulting from arterial disease, digitalis is often impotent or even harmful—the heart continues to dilate and dropsy increases under its use.

While the majority of cases of fibrillation respond in a marked manner to digitalis, it is found, as a matter of experience, that the reaction varies according to the etiology and rate of pulse. Cases which respond most certainly and rapidly are those resulting from old rheumatic lesions, in which the rate of pulse is not greatly above normal, and symptoms of failure arise gradually. There is another type of case, also of rheumatic origin, in which fibrillation occurs suddenly, and heart failure soon becomes extreme; in these cases the pulse is usually rapid and the reaction is uncertain. Fibrillation not uncommonly ensues in the course of arteriocardiosclerosis; generally the reaction is slight or absent, occasionally the heart slows to some extent, but improvement in the general symptoms is not proportionate. Exceptionally, a typical reaction occurs. Generally speaking, Windle says, improvement in cases of this kind is proportionate to the degree of slowing of the heart, and digitalis must be given in sufficient doses to reduce the rate at least to normal, and in most cases considerably lower, to get the best results. Upon commencing treatment, 15 minims of the tincture should be given four times a day until the pulse shows from 50 to 60 a minute, which it will do, as a rule, within a week. In most patients the improvement with this rate of pulse is maintained, when the same dose should be given three times a day and its effect watched. In others, the case hangs fire; the drug should then be pushed until its full physiological effect on the pulse is produced. The evidence of this is either a regular slowing of the heart to about 40 beats a minute, or the occurrence of

<sup>1</sup> British Medical Journal, London, February 25, 1911.



coupled heart beats. A pulse of 50 or over is always characteristically irregular; when the rate falls below 50, it exceptionally becomes regular, the number of heart beats being the same as the pulse. More frequently the full effect is shown by the occurrence of coupled beats; these are readily recognized on auscultation—two heart beats follow quickly on each other, succeeded by a long pause; the first beat is strong, the second short and feeble. The guide of dosage during treatment, Windle claims, is the effect produced on the heart, and this can be determined by auscultation, the rate and rhythm of the beats furnishing the necessary indications.

Digitalis has been used by Focke<sup>1</sup> to *arrest the tendency to spontaneous epistaxis*. He has given digitalis for this purpose in 84 cases, and it proved successful except in a hemophiliac and in a woman given to excessive coffee drinking and tight lacing. In 75 per cent. of the patients the tendency to nose-bleed was promptly and permanently arrested within twenty-four hours after taking the digitalis, even in a few cases in which the bleeding was due to some anatomical anomaly, correction of which later permanently arrested the tendency to epistaxis. He adds that digitalis formerly was a common remedy for a tendency to hemorrhages, but it was abandoned toward the close of the last century for theoretical reasons, which have since been shown to be erroneous.

**Dry Heat.** Superheated air in the after-treatment of laparotomized patients formed the basis of an interesting paper by Strümpel.<sup>2</sup> He is enthusiastic over the way in which peristalsis is stimulated after a *laparotomy* by applying heat to the abdomen, either in the form of the hot air box or an incandescent electric light box. He has used the latter exclusively, as he happened to have a contrivance of the kind on hand. In his 141 cases, flatus passed generally in from eighteen to twenty-four hours, seldom as late as forty-eight hours. Another advantage of the method is that the patients are thoroughly warmed by it, counteracting the tendency to chilling during the operation. The temperature in the box can never get over 55° C., so that the box does not require very close supervision. He applies it for an hour and a half at a time, with intervals of three hours, and keeps this up night and day until all danger of intestinal paralysis is past. He has never witnessed any injurious effect on the heart and vessels, although he has kept close watch for any tendency in this direction. No adjuvant measures were needed in any instance, as the heat answered all purposes, except in a few cases a pint of water was injected to soften the feces, or an intestinal tube was inserted to promote the passage of flatus when the patients were too weak to strain. The heat not only stimulates peristalsis, but

<sup>1</sup> Therapie der Gegenwart, Berlin, September, 1910, li.

<sup>2</sup> Deutsch. Zeitsch. f. Chirurg., Leipsic, 1910, cv, Nos. 5 and 6.

seems to promote absorption and prevent formation of adhesions, while it seems to attenuate the virulence of bacteria in the region.

Schmidt<sup>1</sup> has been systematically applying dry, hot air in the treatment of *bronchitis* for a number of years, and has found it useful in simple chronic catarrhal inflammation of the larynx and bronchi; it is less effective in emphysema, bronchitis, and bronchiectasia, and is unreliable in tuberculous pulmonary and laryngeal processes. The patients inhale the superheated air through a tube with removable glass mouthpiece; the air is filtered through cotton, dried by passing through calcium chloride, and heated in a small chamber inside a large asbestos-coated stove heated by gas or electricity. A thermometer is mounted in the tube near the mouth. The patients experience great relief from the dry hot air thus inhaled through the mouth and expelled through the nose, and in many cases the bronchitis seemed to be permanently cured.

Ravant<sup>2</sup> reports the results which he has obtained in various *affections of the skin* treated by hot air. He employed the apparatus constructed by Gaiffe, in which air heated by an electric current to a temperature varying from 60° to 80° C. is projected through variously sized and shaped tips upon the skin. The hot air thus obtained is employed for various purposes: At a temperature not exceeding 80° C. an active hyperemia of the parts treated is produced; at an elevated temperature cauterization and carbonization of the tissues to a varying depth results. As complete immobility of the patient is necessary to obtain the best results, and as the pain is considerable, the author advises general anesthesia. *Nevus, lupus, cutaneous tuberculosis, epithelioma, and leukoplakia* are some of the more important affections in which this method of treatment was employed with more or less success, the air being used at a high temperature for its cauterant effects. The hot air treatment was likewise employed to produce hyperemia in *torpid ulcers*; and cicatrization was more rapid in these cases than in those treated by the usual methods.

**Ergot.** The pharmacology of ergot has been studied by Wood and Hofer,<sup>3</sup> who have elucidated some important facts concerning this drug. They pointed out that ergot is a stimulant to all the unstriated muscle tissue of the body. As a part of this general action there is a stimulant effect on the arterial muscles, and probably also on the heart. The action on the bloodvessels occurs after the destruction of the vasomotor centre, and, therefore, must be the result of an effect on some portion of the peripheral vasomotor mechanism. The degree of elevation of blood pressure affords an accurate criterion of the activity of ergot, and is, in their opinion, the most available method for the biological assay of

<sup>1</sup> Therapie der Gegenwart, Berlin, 1911, lii, No. 1.

<sup>2</sup> Annales d. dermat. et de syphil., 1910, No. 3.

<sup>3</sup> Archives of Internal Medicine, Chicago, October 15, 1910.

the drug. The active principle of ergot is an alkaloidal substance which occurs in the drug, probably in chemical union with a resinous body. For the combination they suggest the retention of the name suggested by Jacobi—sphacelotoxin—and for the alkaloidal substance the term applied by Kraft—hydro-ergotinin. The percentage of sphacelotoxin varies accurately with the physiological activity of different physiological activity of different specimens of ergot. A fluid extract of ergot exposed to the air deteriorates extremely rapidly. The deterioration of fluidextract of ergot may be much retarded by protecting it against contact with the air, but under the most favorable conditions there is a loss of strength approximating 10 per cent. a month.

**Exercise and Rest.** Properly regulated rest and exercise in *pulmonary tuberculosis* formed the basis of an interesting discussion by Brown and Heise.<sup>1</sup> In considering the subject from this point of view, we must bear in mind that we are not dealing with the body in health, but with the body affected by disease. Exercise, which in health would help to build up the normal body and to increase resistance to disease, might, in illness, when injudiciously carried out, lead to much harm, weakenng the resisting powers and hastening the progress of the disease. When judiciously regulated, however, after the acute manifestations have passed, exercise may be of inestimable benefit in helping the body to regain once more its normal functions and capacity for work.

Exercise should be taken only under the guidance of a physician, one who thoroughly understands the course and treatment of the disease. At the same time, the patient must not be a mere automaton, following blindly and without thought. No patient feels the same day after day, that is, his state of body and mind are not the same, and therefore variations in his activities must be regulated accordingly.

There are four cardinal symptoms that Brown and Heise call attention to, the presence of one or more of which calls for rest. They are, therefore, *contraindications for exercise*. These symptoms are:

1. Blood in the sputum (hemorrhage).
2. Elevation of body temperature (fever).
3. Increased rapidity of pulse.
4. Persistent loss of weight.

Besides these, nearly every other symptom of the disease modifies to a degree the taking of exercise. Especially should cyanosis or blueness of the nails, lips, etc., and marked shortness of breath be taken into account.

When there is blood in the sputum there is usually a leak from a blood-vessel which has ruptured under abnormal strain. Exercise quickens the pulse and circulation, and raises the pressure under which the blood flows, and thereby increases the strain upon the bloodvessels. This is

<sup>1</sup> Journal of Outdoor Life, June, 1911.



just what is most desired, therefore rest is called for. When the patient's morning temperature is 99° F., or when the temperature rises nearly to 100° F. or over at any time of the day, absolute rest in bed is needed until the temperature has not gone above 99° F. for a week or more. Walking may be instituted, providing, of course, no other contraindications are present and the physician's consent has been obtained. The duration of walks should be only five to six minutes at first. More relapses, more failures to recover, are due to overexertion than to any other cause.

As a general rule, it may be said that a rapid pulse of 110 to 120 beats a minute during rest demands absolute rest in bed. When the pulse remains, during rest, consistently below 110 beats per minute, the patient may sit in his chair enjoying light diversions, providing, of course, no unfavorable symptoms are present. Walking is not to be taken up until the pulse rate remains during rest consistently below 90 beats per minute for a man and 95 per minute for a woman, and then only when all other contraindications are absent. The pulse rate may be increased and the temperature elevated temporarily immediately after exercising. If this does not persist after resting one-half hour, it may with comparative safety be disregarded.

Persistent loss of weight means the continuous utilization of stored-up energy by the body, or the improper and incomplete utilization of ingested food. Exercise would, under these conditions, only increase the severity of the process, even though the body temperature were not elevated and the pulse rate not increased. Furthermore, if the patient is more than a pound or two below his normal weight, it is best to postpone walking until at least his normal weight is reached.

Outdoor walking on the level is, perhaps, the simplest, safest, and easiest form of regulated *exercise for the tuberculous*. They set forth the following simple rules that should govern the time and manner of their employment:

1. Walk slowly; never try to make time. Two miles an hour is a good rate.
2. Never walk to the point of fatigue.
3. Walk uphill at the start so as to come down hill on the return, when weariness is more apt to occur.
4. Rest at least one-half hour immediately before and after meals.
5. Exercise systematically, whether rain or shine.
6. Time and not distance is the best measure; not how far, but how long.

For the patient who must return to work, exercise graded in severity may be prescribed in place of walking. Some form of exercise should finally be undertaken which will approximate in severity the work the patient must later do. Several grades, varying in severity, may easily be mapped out, and the patient passes from one grade to another when it is seen that no ill effects are produced.

They sum up the subject by saying that exercise, when properly regulated, is an important factor in the treatment of pulmonary tuberculosis. Through it the patient is in many cases returned to home and family with lessened chances of future relapse. At the same time part of his earning capacity is restored, and he is consequently financially less dependent upon others, relieving him of much worry, expense, and hardship.

Francine,<sup>1</sup> in discussing *rest and exercise in tuberculosis*, advises that in all moderately advanced cases with fever, rapid pulse, cough, etc., the patients should be confined to bed until these symptoms are relieved. In most early cases the patients are far better off for a preliminary rest cure in bed, and in the beginning, even in incipient cases, the patients should take as little exercise as possible.

Fever, cough, night sweats, loss of weight, anemia, weakness—all indicate rest. As an example of its practical application, he instances the chronic type of case, in which the patient, while without fever or other symptoms, yet suffers with a coughing spell on rising, through which he loses his breakfast. Such patients, he tells us, should stay in bed without eating, keeping their head low until this coughing and gagging spell is over, should then rest quietly with the head raised for half an hour or so, to allow their stomachs to settle, should then take their breakfast in bed, and rest in bed for an hour or so after. In this way they can retain their first meal.

He cites Patterson's experience at the Frimley Sanatorium. When a reaction occurs, the patient is put to bed at once. He is not allowed to talk or read; is instructed to lie perfectly still; is not permitted to wash his own face or hands, nor even to get up to go to the toilet; in other words, the rest is as complete as it possibly could be, like that of a typhoid fever case. The symptoms of the auto-intoxication resulting from the reaction quickly subside under this treatment. As soon as the patient is up and about he goes back to work, and none of them seem any the worse for the temporary overdose of toxins.

Fränkel<sup>2</sup> reviews the experiences with *Klopp's method of creeping gymnastics in the treatment of scoliosis*. He states that it is proving all that was hoped for it at first, not only for the prevention and treatment of scoliosis, but for the secondary heart disturbances, as he shows by a number of case reports and illustrations "before and after." The position assumed in this creeping counteracts the tendency to abnormal curvature of the spine. He cites a case of a dorsolumbral scoliosis with cardiac symptoms, who was greatly benefited by this form of exercise. In two cases, a heart defect had developed in consequence of an infectious disease, and the curvature of the spine was of minor importance; the

<sup>1</sup> New York Medical Journal, December 31, 1910.

<sup>2</sup> Münch. med. Woch., lvii, No. 33, pp. 1721 to 1768.

favorable influence of the creeping exercise in these cases opens up new prospects for treatment of organic heart disease. In one of the cases a concomitant area of dulness over the heart apex cleared up during the exercise; it seems evident that the creeping by mobilizing the thorax provides better conditions for ventilation and circulation in the lungs. Klapp's experiences with these creeping exercises in treatment of disturbances entailed by Stiller's universal asthenia, and also in orthostatic albuminuria, are encouraging. Fränkel remarks in conclusion, that the creeping exercises represent great progress, even if considered only as an effectual means of prophylaxis of scoliosis, and for active mobilization of the chest and thoracic vertebræ.

**Massage.** Heyerdahl<sup>1</sup> reviews the Danish literature on the subject of "Massage in the Treatment of Muscular Rheumatism" in the last five years, and reports excellent results from moderate massage. Muscular rheumatism affects both in muscle and fibrous tissue, the main symptoms being pains, tenderness, and functional disturbances. They differ from nervous disturbances in the hindrance to the movements of the part, and in the fact that the rheumatic pains are more severe in the morning or after rest, and are improved by work, contrary to what is observed in neuritis. The rheumatic pain in the head radiates from the back of the neck upward, while the neurasthenic headache spreads sideways over to the forehead back of the eyes, and thence upward to the top of the head. The rheumatic pains also occur only with certain movements, while the nervous accompany any movement. The lumps and nodules felt by some in the muscles, the seat of the rheumatism, he thinks are merely the natural contraction of the muscle under the influence of the palpation. Local tenderness is not a reliable means of differentiating between nervous and rheumatic affections, he declares, as there are so many points which are sensitive in everyone. Rest is useful in nervous and periosteal affections, while the muscular profit by a certain amount of exercise.

Massage and gymnastic exercises *during pregnancy and the puerperium* find a staunch advocate in Kirchberg,<sup>2</sup> who does not hesitate to state that constipation in pregnancy and the puerperium yields invariably to a correct course of massage and exercises. He describes a number of exercises and massage manipulations, the patient aiding by deep breathing in jerks, three pauses in each inspiration and expiration, drawing in the breath rapidly, holding it, and then slowly expelling it. The staccato deep breathing and pauses exercise both diaphragm and abdominal muscles, and promote the circulation, thus warding off varices. Among other useful exercises for the pregnant woman is to have her lie on her back, twist, bend, and lift the legs. Twisting the legs from side to side

<sup>1</sup> Ugeskrift for Læger, Copenhagen, lxxiii, No. 16.

<sup>2</sup> Monatssch. f. Geburt. u. Gynäk., Berlin, 1911.



with the knees bent, exercising against resistance, acts particularly on the abdominal muscles. He ascribes the development of the breasts to the condition of the pectoral muscles, which aid in developing the bust, which massage of the breasts alone is unable to accomplish. Frequent reclining with the pelvis raised will aid in curing a tendency to varices and hemorrhoids. Any rise in temperature, he says, directly contraindicates massage under any conditions. With uncontrollable vomiting, massage and exercise are indispensable adjuvants.

**Fibrolysin.** Mendel<sup>1</sup> reviews the work of other observers regarding the action of fibrolysin, together with his own personal experiences. He says that this remedy has a specific action in promoting the absorption of scar tissue of every description. He speaks particularly of its good effect in the treatment of *arthritis deformans*. Untoward by-effects are very infrequent. A febrile reaction occasionally results from an injection of fibrolysin, and is due, according to Mendel, to anaphylaxis. Mendel suggests that fibrolysin may be given in the form of suppositories in suitable cases.

**Glandular Extracts.** CORPUS LUTEUM. During the last few years Leo Loeb has published a number of observations on the function of the corpus luteum, which have much significance in both biology and pathology. It may be recalled that the corpus luteum has a histological structure strikingly similar to that of the adrenal cortex, a fact which makes it probable, if not certain, that this transitory cell mass must possess some function in the way of internal secretion. In consequence of this fact and sundry experiments, various hypotheses have been evolved, but without the final establishment of the function of the corpus luteum. Through an extensive series of experiments Loeb<sup>2</sup> has now positively determined that this organ does produce an internal secretion or secretions which exercise an important influence on the sexual cycle.

One function of this secretion seems to be that of prolonging the length of time between two successive ovulations, so that during pregnancy the useless discharge of mature ova from the ovary is prevented, whereas, if impregnation does not occur, the early atrophy of the corpus luteum of menstruation or ovulation permits of more rapid maturation of ova, thus hastening the time of the next possible impregnation.

Another function, and one that seems especially related to cell growth and tumor formation, is that of sensitizing the uterine mucosa so that it reacts to any sort of mechanical stimulus by forming a maternal placenta. Normally, this stimulus is furnished by the impregnated ovum, but as any foreign body will have the same effect as the ovum in

<sup>1</sup> Therap. d. Gegenwart, 1911, lii, 155.

<sup>2</sup> Journal of the American Medical Association, October 30, 1909; Medical Record, June, 25, 1910.

this respect, as was shown by Loeb's experiments, the purely mechanical nature of the stimulus is evident.

Fränkel,<sup>1</sup> from an exhaustive experimental research, substantiates the theory which he advanced seven years ago, that the corpus luteum is a gland with an internal secretion which brings about the alterations essential to the embedding and early development of the fecundated ovum. Further, the corpus luteum is responsible for the cyclic engorgement preceding menstruation. The administration of corpus luteum extract as a therapeutic measure was of no avail in dysmenorrhea, irregular periods, and the intoxications of pregnancy; he has had good results, however, from its use in those cases presenting symptoms of vasomotor origin, due to an absent or diminished ovarian function. The article embraces an excellent summary of the recent contributions of this subject.

In 9 cases, Maits<sup>2</sup> has used an extract of human corpus luteum made by A. J. Smith in the University of Pennsylvania laboratories. He found that the extract of human corpus luteum possesses a distinct therapeutic action in osteomalacia, disturbances of the natural and artificial menopause, and in hypofunction due to infantile uterus. In amenorrhea and in dysmenorrhea, the treatment must at first be given each month. How long this must be continued before a permanent cure is effected and the injections can be omitted, Maits has not yet determined.

**PITUITARY EXTRACT.** This subject was reviewed by me in *PROGRESSIVE MEDICINE* for 1910, and attention was called to its action on the heart and blood pressure. The chief idea brought out by Wiggers<sup>3</sup> in his paper on the physiology of the pituitary gland is that the anterior lobe of the pituitary gland evidently elaborates a secretion that is necessary to life and to normal metabolism and development. This substance has so far resisted extraction by various solvents, hence its chemical nature and physiological properties remain unknown. The posterior lobe, which is not of vital importance, contains or secretes a substance that may be extracted by water, glycerin, or salt solution, and resists boiling, but it has not been demonstrated that it is identical with the secretion of the anterior lobe or that it represents its vital principle. The extracts constrict the peripheral vessels (probably by a direct muscular action), thus producing a marked rise of arterial blood pressure. This constriction is not equally pronounced in all organs, for the renal vessels are, at least passively, dilated during its action. Pituitary extract resembles adrenalin in its action only, says Wiggers, in that it causes a rise in blood pressure. The manner in which they affect the heart and bloodvessels, as well as the effects induced, are entirely

<sup>1</sup> Arch. f. Gynäk., 1910, xci, 705.

<sup>2</sup> University of Pennsylvania Medical Bulletin, Philadelphia, July, 1910.

<sup>3</sup> American Journal of the Medical Sciences, April, 1911.

different. In addition to its cardiovascular actions, pituitary extract augments the secretion of urine and inhibits the flow of pancreatic juice, but it has not been definitely determined whether these varied reactions are due to separate substances, to a specific affinity of a single substance for different cells, or whether they are secondary to changes in the circulation.

Cushing and Goetsch<sup>1</sup> state that the object of their communication is to call attention to the presence of a substance in the cerebrospinal fluid which gives the same reactions as extracts of the pars nervosa itself, indicating, in all probability, that the active principle long recognized as being confined to this anatomical subdivision of the gland is actually secreted into the ventricular cavity. This would seem to establish the theory that the hyaline bodies of the pars nervosa, regarded by Herring as products of secretion of the posterior lobes—a view supported on experimental grounds by the authors—actually discharge, as their histological appearance suggests, into the third ventricle, and represent the source of the active substance resembling pituitrin in the cerebrospinal fluid.

Klotz<sup>2</sup> writes from Sellheim's clinic to describe experimental researches and clinical experiences with an extract made from the hypophysis. It induces a moderate rise in blood pressure, lasting for several hours, with only slight demands on the heart. At the same time it stimulates the heart and peristalsis, and also the bladder, and increases the output of urine while it proves a stimulant for the uterus and the cardiovascular system in general. By intramuscular injection the action is speedy, and he does not think that any injury of the human organism under moderate dosage need be feared. In the goat, Ott and Scott<sup>3</sup> found in the early nursing period that infundibulin injected into a vein in the ear rapidly and greatly increases the flow of milk. The nipple had a cannula inserted into it and a water aspirator produced the suction necessary to empty the udder. The milk aspirated before and after the injection was caught in a graduated flask and measured every five minutes. This increased flow of milk is not due to an increased amount of blood in the udder, as infundibulin contracts the arterioles. This fact, the authors state, can be correlated with the increased size of the pituitary in pregnancy, although in these cases the enlargement is chiefly in the anterior lobe.

Scott<sup>4</sup> believes that the extract should prove of value in controlling hemorrhage due to uterine carcinoma, and cites an instance where it was used successfully for such purpose. Bahrman<sup>5</sup> reports a few cases

<sup>1</sup> American Journal of Physiology, November 1, 1910.

<sup>2</sup> Münch. med. Woch., May 23, 1911.

<sup>3</sup> Monthly Cyclopedia and Medical Bulletin, Philadelphia, November, 1910.

<sup>4</sup> New York Medical Journal, April 1, 1911.

<sup>5</sup> Medizin. Klinik, February 5, 1911.



of inhibited cerebral development in which improvement was obtained after the administration of tablets made of the tissue of the hypophysis.

THYROID EXTRACT. I have reviewed this subject at some length,<sup>1</sup> and called attention to its employment as a remedial measure in the *treatment of infantile wasting*, by Simpson, and in *suppurating conditions*, by Siegmund.

Wilson<sup>2</sup> tells us that the use of thyroid extract in *rheumatoid arthritis* first suggested itself to him in 1907, when called to attend an advanced case in which the patient was bedridden, all the joints being more or less involved, with extreme wasting, anorexia, sleeplessness, and constant pain. The patient, a man aged fifty-four years, had no illness until the onset of this condition, which had been coming on gradually since he was forty. He could not stand, had lost all power of locomotion, could not feed himself, nor raise his arms to brush his hair. The writer was struck with his rough, dry, harsh skin, crisp hair, husky voice, and deep suprasternal notch; the prominence of the trachea and apparent absence of thyroid gland, analogy to other conditions suggesting deficiency of thyroid secretion.

Accordingly, the extract of thyroid was administered in doses of 5 grains three times daily, together with adjuvant treatment to be mentioned presently. In a month the results were remarkable. The patient could struggle on crutches from one room to another, his appetite returned, and pain was almost gone. In three months he could walk with two sticks, and in eighteen months he was able to walk three miles with the aid of one stick. His elbows and shoulders have regained their mobility almost entirely, and he has been for a year able to do without his thyroid extract without a relapse.

The author cites another case of similar character, in which thyroid medication greatly improved the condition. In the writer's opinion, the group of cases likely to receive benefit are those in which changes are chiefly confined to the synovial membranes, without erosion of cartilage or eburnation of bone, such cases, in fact, as Schüller describes as "chronic villous arthritis."

In these cases, the local improvement is evinced by gradual softening of the pulpy synovial tissue under the influence of thyroid extract, the gelatinous feel under one's finger being replaced by a sensation of fluctuation. Subsequently absorption appears to take place, leaving a firmer, more useful joint, and at this stage adjuvant treatment by means of passive movement, massage of the neighboring muscles (not the joint) and ligaments, are of great efficiency.

Jones<sup>3</sup> observes that thyroid secretion has a powerful action upon proteid catabolism, as physiologists have shown, and is demonstrated

<sup>1</sup> PROGRESSIVE MEDICINE, December, 1910.

<sup>2</sup> British Medical Journal, December 10, 1910.

<sup>3</sup> Ibid., February 25, 1911.

by the increased nitrogenous excretion and loss of body weight. They have further shown that it lowers blood pressure, causing increased circulation of lymph. This increased lymph circulation renders the blood more watery, and causes dehydration of the tissues. These two physiological actions appear to Jones to offer some explanation of the beneficial action of *thyroid extract in certain cases of cancer*. The increased proteid catabolism might act in two ways. In the first, it would shorten the life history of the cancer cells by stimulating catabolic processes and fibrosis of the central mass of the growth. In the second place, its influence upon the connective tissue immediately adjacent to the cancer focus is probably still more important. By its stimulation of proteid metabolism within the connective-tissue cells, its acceleration of lymph flow and dehydration of the tissue, it would modify the increased cellularity of the subcancerous zone of connective tissue, which, according to Bonney, is so favorable to cancerous invasion, by converting it into fibrotic connective tissue, and thereby arrest centrifugal growth of the growing edge. By this dual action of quickened life cycle of the cancer cells and fibrosis of the connective tissue around, a negative phase of the growth is obtained.

Beebe,<sup>1</sup> in an interesting paper, reviews our present knowledge of thyroid function, dealing particularly with the most recent progress and knowledge derived through experimental research of this intricate and complex organ.

**Glycerin.** In PROGRESSIVE MEDICINE for 1910 I reviewed the report of Vetlesen's 2 cases of *pernicious anemia*, which had been greatly improved under the glycerin treatment.

In Muktedin's<sup>2</sup> case, the patient was a man, aged thirty years, infected with syphilis four years before; the anemia continued to progress, even under mercury and iodide, until there were only 970,000 reds and 4000 whites. A course of glycerin was commenced last February. A table-spoonful of glycerin was given three times a day at first, and later up to 70 grams. The man began to improve at once, and by the end of a month the reds numbered 4,200,000; the whites, 5300, with 100 per cent. hemoglobin. This confirms Tallquist's experience in a similar case. Both patients seem to be permanently cured. Muktedin's patient is still taking a little glycerin, and seems strong and well. It is possible, he adds, that the glycerin may benefit only in the cases of anemia of intestinal origin. The only by-effect in his case was a brief transient diarrhea.

**Gossypii Cortex.** The frequent use of gossypii cortex as an emmenagogue and abortifacient has led Scott<sup>3</sup> to study the *effect of this agent upon uterine contractions*. He found that the drug acts as well on the

<sup>1</sup> Journal of the American Medical Association, March 4, 1911.

<sup>2</sup> Deutsch. med. Woch., Berlin, 1911, xxxvii, No. 20.

<sup>3</sup> Therapeutic Gazette, March, 1911, p. 162.

excised uterus as on the uterus with blood and nerve supply intact. The powdered extract gossypii cortex was rubbed with distilled water, and placed in Ringer's fluid, in which was immersed a piece of the uterine horn. The contractions almost immediately increased in force, and the tonus was markedly increased and remained so for some time. To determine if the drug acted as well on the uterus with the blood and nervous supply intact, he used Cushny's method of incising the lower abdomen in the median line, and exposing the uterus. With this method increased contractions were noted, as in the previous procedure. In view of the extremely uncertain properties and keeping qualities of ergot and its preparations, and the fact that gossypii cortex is stable and very active, as shown in the above experiments, he thinks that the drug is deserving of a more extended clinical use in the class of cases in which ergot is indicated.

**Hydrotherapy.** The principles of hydrotherapy are discussed by McCrae<sup>1</sup> under three headings, which exemplify to a considerable degree the main uses. These are (1) internal hydrotherapy, (2) local hydrotherapy, and (3) general hydrotherapy.

The general effects of internal hydrotherapy are especially shown in toxic states of all kinds, whether due to acute infections, some disturbance of metabolism, or the more elusive nervous states; in conditions in which a diuretic action is demanded; in local conditions of the digestive tract and its associated organs; and the best performance of the ordinary bodily function is brought about by the ingestion of considerable quantities of water.

In the use of water locally, it is well exemplified by the application of compresses; there are several factors at work. One of the most important of these is the effect on the blood flow through the vessels in and near the affected area. The rate at which fluid flows through a tube is markedly influenced by the temperature, and with increase of this the rate of flow is made slower. Hence a reduction in the temperature results in a much increased blood flow through the vessels. Other influences are also associated with this, especially the effect on the vasomotor system, which varies with cold or hot applications. Another factor is the effect of the application on the osmotic pressure of the tissues and fluids. This is markedly altered in tissues which show inflammatory changes, and its restoration to normal local hydrotherapy has an important influence.

As a familiar example, McCrae cites the use of *cold compresses to the thorax in cases of bronchitis*. No form of treatment, he says, can equal this in the certainty and promptness of its action. When we remember that acute bronchitis is due to an infection in the great majority of cases, it seems reasonable to suppose that the circulation is

<sup>1</sup> Journal of the American Medical Association, vol. lv, No. 19.



definitely affected, as otherwise it is difficult to understand the effect produced. Applications to the thorax in *pneumonia* probably have both a local and general effect. The influence of compresses to the abdomen is seen in their employment in the *meteorism of acute infections* and also in various nervous disturbances such as mucous colitis.

As essential examples of general hydrotherapy are the employment of *tub baths* and *wet packs*. The baths are particularly useful in two great groups of disease infections, both acute and chronic, and various nervous disorders. Perhaps it is in cases of infectious diseases with toxemia and marked mental features that we find the best examples of the favorable results which can be obtained from general hydrotherapy. In these again the coincident use of internal hydrotherapy adds greatly to the effect. Of their value in infectious disease we find no better example than in typhoid fever; while in the functional nervous states, especially when there is insomnia, one of the best therapeutic measures is the use of wet packs.

Bossi<sup>1</sup> has been much impressed with the therapeutic action of systematic *sea bathing* in the mild Italian climate in *all chronic gynecological affections*, especially fibromyomas, chronic endometritis, displacement with adhesions, defective puerperal involution, and chronic inflammation in the genitalia. He insists on medical supervision and on the necessity for utilizing better the medical, thermal, and physical measures, and combating the abuse of mutilating operations. In this line, Bossi adds, gynecological thalassotherapy is one of the most effectual means with which nature has endowed us.

Those with feeble circulation are advised by Copeman<sup>2</sup> to bathe only when the weather is warm and the sea calm, and none but the very robust should bathe more than once a day. He says that it is a common error to suppose that if the bather arrives at the water-side heated by exercise he should wait until he has cooled down before entering the water. On the contrary, it is most unwise to bathe when the body is already chilled and the bather would do well to delay until some gentle exercise has restored the circulation. Continuous paddling cannot be too strongly discouraged.

*Hot baths in whooping cough*, according to Schrohe,<sup>3</sup> are of great value in that disease, and has always witnessed great relief follow a hot bath toward evening. The water should be about 99° F., and the child should stay in the bath for from ten to fifteen minutes, the head being kept cool with a cold water compress. The children sleep well after it, and the number and severity of the paroxysms seem much diminished. He has noticed that the skin of children with pertussis is pale and cool, indicating contraction of the vessels in the skin; the hot bath counter-

<sup>1</sup> Gazzetta degli Ospedali e delle Cliniche, Milan, xxxii, No. 67.

<sup>2</sup> Practitioner, London, July, 1911.

<sup>3</sup> Therapie d. Gegenwart, Berlin., li, No. 9.

acts this, and thus relieves the internal organs, promotes elimination of toxins, and soothes the nervous system and the tendency to the paroxysms.

Goldscheider<sup>1</sup> discusses the *physiological action of carbonic acid baths*, and says that it is well known that carbonic acid gas produces a very intensive sensation of heat. This can be weakened by lowering the temperature of the water, but cannot be destroyed even by very low temperatures. The great sensation of heat obtained on the scrotum is to be ascribed to the sensitiveness of the nerves involved, as is shown by the fact that it is associated with a prickly sensation.

Determan<sup>2</sup> expatiates on the beneficial *stimulating effect of a bath of only four to ten seconds' duration in water at a temperature of 37° to 45° C. (98.6° to 133° F.)*. The patient can lie down in the bath himself, or be lowered into the water by two attendants. After the bath the patient is wrapped in blankets and lies quietly for an hour. Even weak patients can take these brief hot dips, which do not exhaust them, while they induce a vigorous reaction. The duration of the bath is so short that the body does not become overheated. The special indications for these hot dip baths are general motor weakness and general sensory irritability in persons free from organic disease. Partial hot dip baths may also prove useful in cases in which a full bath is too much of a strain.

**Ichthyol.** It is believed by Barnes<sup>3</sup> that ichthyol is a safe and valuable remedy in the treatment of such diseases of the respiratory tract as *tuberculosis* in its early stages, *bronchitis* in all its forms, and *pleurisy*. Ichthyol, when given in large doses, as high as 20 grains, three times a day, he claims, will produce a tendency toward frequent movements of the bowels. It diminishes the quantity of the discharge from the bronchial mucous membrane, and hastens the return to a healthy condition, especially in the case of patients who have recovered from the acute attack but still retain a cough, accompanied by profuse expectoration. Barnes believes that the drug is rapidly broken up in the stomach, and that it acts as a stimulant on the gastric mucous membrane, promoting a larger flow of gastric juice and increasing the power of digestion, thus aiding in the assimilation of food. Patients who have done well under ichthyol immediately begin to show a greater desire for food, and their appetites begin to increase with remarkable rapidity. His experience with the drug has convinced him that unless there is this immediate improvement in the desire for food it is unwise to continue the treatment. In prescribing ichthyol for internal administration, Barnes' practice has been to give it in solution, and because of its objectionable taste, it is necessary to combine it with ordinary pepper-

<sup>1</sup> *Medizin. Klinik*, May, 14, 1911.

<sup>2</sup> *Ibid.*, Berlin, vii, No. 23.

<sup>3</sup> *Medical Record*, New York, January 21, 1911.

mint water, which makes a fairly palatable mixture. Sometimes he adds a small amount of fluidextract of licorice, together with pepper-mint water. It should be given after meals. A very convenient form of administration is to give it in the form of a tablet containing 5 grains.

**Iodine.** From time immemorial iodine in some form or other has been recognized as a valuable remedy in *tuberculosis*, but there has always been some difficulty experienced in its use on account of its tendency to upset the digestive tract, and in that way interfere with nutrition. These untoward effects led Flick<sup>1</sup> to use iodine by inunction. He has used iodoform in cod-liver oil and in olive oil, but discarded its use on account of the odor. He has since used cresol iodide inunctions in all cases of tuberculosis. Like iodoform, this substance gives striking results. There are other forms of iodine besides cresol iodide, and iodoform which can be used for inunction. Iodized oil, which is much cheaper than a solution of cresol iodide, gives satisfaction, although it does not seem to the writer to be as useful as the latter. It is his belief that part of the value of cresol iodide and iodoform lies in breaking down after absorption, with production of nascent iodine, but for this view he asserts he has nothing but an impression. There are quite a number of iodine compounds similar to these two which may be used, but some of them break down too rapidly, and others too slowly. There are preparations which are much richer in iodine than cresol iodide, and which would probably be more valuable for inunction purposes were it not that they break down almost immediately when dissolved in oil, and therefore give practically an iodized oil.

Some of the formulas which the author has used with satisfaction are as follows:

R <sub>x</sub> —Cresol ioidid.	3ij
Ol. rosa	gtt. ij
Ol. anisi,	
Ol. gaultheriæ	āā f5ij
Ol. olivæ	q. s ad f3v—M.

Sig.—Rub into the body as directed.

R <sub>x</sub> —Cresol ioidid.	3ij
Ol. anisi,	
Ol. gaultheriæ	āā f3ij—M.

Sig.—Rub into the body as directed.

R <sub>x</sub> —Cresol ioidid.	3ij
Ol. gaultheriæ	f3ij
Adipis lanæ hydrosi	f3ij—M.

Sig.—Rub into the body as directed.

A secondary effect of the inunction which perhaps contributes a good deal to its usefulness, is the stimulation of the vessels in the skin by the rubbing and the gaultheria. It is quite possible, too, that the

<sup>1</sup> Monthly Cyclopedia and Medical Bulletin, August, 1910.



gaultheria itself may have a medicinal influence, as may also the oil of anise. In recent years the author has extended his inunction treatment with marked benefit to the pharynx in those cases in which there is a chronic granular pharyngitis. In tuberculosis this unhealthy condition of the lymphatic tissue of the pharynx and the postnasal pharynx, apparently due to a mixed infection of some character, occurs quite often. It is a great source of annoyance to the patient, and appears to be an impediment to recovery. It is a troublesome condition which does not readily yield to treatment. Flick asserts that he has found inunction of these parts, especially around the tonsils, with a saturated solution of cresol iodide in equal parts of oil of anise and oil of gaultheria the most effective treatment with which he has had experience. He applies the oil on a pledget of cotton, rubbing it in with considerable vigor.

After a long experience with iodine inunction in tuberculosis, he states he is convinced that it is a valuable method of treatment.

Antelo<sup>1</sup> remarks that tincture of *iodine is the ideal skin antiseptic in military surgery*. It is desirable to add to the individual field dressing an adequate receptacle containing tincture of iodine. This is intended to be used to sterilize the skin and the entrance and exit wounds. In sanitary formations, where a surgeon is present, the operative field should, in case of need, be sterilized by the Grossich method, that is, washing the region of operation on the day of the operation, an aseptic application until the patient is placed on the operating table, and finally, the application of two coats of iodine tincture, one at the beginning of the anesthesia and the other when the subject is anesthetized. After suture of the skin, there is a last application upon the line of sutures and the borders of the incision. The hands should be treated with tincture and then decolorized with sodium hyposulphite. The supply of tincture of iodine to the sanitary formations at the front should be calculated in accordance with its use as described.

**Ipecacuanha.** I have reviewed this drug in *PROGRESSIVE MEDICINE* for 1909, and pointed out its beneficial action in *amebic dysentery* and in preventing the occurrence of *hepatic abscess*. More recently Pilgrim,<sup>2</sup> who is the Surgeon-Superintendent, Presidency General Hospital of Calcutta, takes exception to a number of papers which have been published in the last few years, the purport of which has diminished confidence in this somewhat ancient remedy, which, within the last few years, has been resurrected and proved to be almost a specific. Pilgrim is free to admit that as yet he is entirely unable to explain how the ipecac does good. While he is interested in solving the problem of its method of action, he nevertheless is so convinced of its value that he pleads with the profession not to cast it aside because its action is unknown, since by so doing many valuable lives will be lost.

<sup>1</sup> Military Surgeon, December, 1910.

<sup>2</sup> Indian Medical Gazette, Calcutta, September, 1910.

Although he does not claim that it is possible to cure hepatic abscess, he believes that the hepatitis which leads to the formation of the abscess can be readily recognized in many cases before pus is formed, and that ipecac will prevent the development of the more serious condition. The patient at this time suffers from a general feeling of lassitude, loss of appetite, foul tongue, pain in the right shoulder and hypochondrium. The liver is enlarged, and there may be loss of weight, with varying degrees of elevation of temperature, sweats, and chilly sensations. The blood examination reveals a marked leukocytosis, although the polynuclear increase is not very great. Of course, the onset is more insidious. A careful examination will often discover the condition of the liver. Pilgrim is certain that the use of alcohol and a diet consisting largely of meat distinctly predisposes to the development of this hepatic complication of dysentery, particularly alcohol.

The treatment of the acute hepatitis preceding the formation of liver abscess is described by Pilgrim as follows: When not associated with loose stools, and the bowels are, on the contrary, inclined to be costive, a mild mercurial purge is first given, otherwise the ipecacuanha treatment is begun on the evening of admission or on the diagnosis of the disease. It is necessary that the patient should have nothing to eat or drink for at least two hours before and after the giving of ipecacuanha. Twenty minutes before taking the ipecacuanha, Pilgrim gives 20 grains of chloral, and then, in average cases, he gives 25 grains of ipecacuanha. In severe cases, in which the full influence of the drug is immediately required, he gives 30 grains for the first three or four nights, after that reducing to twenty-five and twenty grains gradually. He has occasionally given 40 grains, but he believes that this is seldom necessary, and the cases treated by him have responded very favorably to 30 grain doses and less. As a rule, he finds one dose daily suffices, but in severe cases he does not hesitate to give it night and morning, and also in cases not apparently severe, but in which the leukocytosis does not rapidly reduce. The ipecacuanha is given in keratin capsules, 5 grains in each; given in capsule, both the nausea and vomiting are greatly reduced. Many patients do not vomit at all, but only suffer for a short time from nausea, while some few are absolutely free from any unpleasant or abnormal sensation. It is a question whether the capsule breaks or comes undone before it has passed through the pylorus. After swallowing the ipecac, the patient is enjoined to lie absolutely still in bed, when, under the influence of chloral, he usually soon drops to sleep, and if he wakes up two or three hours later, feeling uncomfortable, the drug will at all events have largely exerted its influence.

The daily dose of ipecac is continued until the leukocytosis falls to 10,000 or less, and the temperature has become normal, and the pain or discomfort in the region of the liver has gone, this latter being among the first symptoms to disappear under this treatment. Then the ipecac

is continued for another week in daily doses of 20 grains, for by this time, even in cases in which the drug has proved obnoxious, toleration is usually established, and the patient, seeing the result obtained, is seldom refractory. Other important accessories, such as diet and rest, are very carefully arranged for. At the end of about two weeks patients are allowed up, and after a few days are sent away for a change, and urgently advised never to touch alcohol in any form, no matter how moderately, so long as they have to reside in India.

Brem and Zeiler<sup>1</sup> sum up their experience with intestinal amebiasis by saying:

1. We despaired of success after four years of experience in attempting to eradicate intestinal amebiasis by means of rest, dieting, and lavage of the colon. We used copious enemas of normal salt solution, quinine, thymol, and quinine and thymol combined.

2. We have apparently cured 14 amebic infections with ipecac—8 with dysentery followed six weeks to five and one-half months with repeated examinations for amebæ; 3 with dysentery followed less than six weeks; 3 without dysentery followed two to five months. We have failed to eradicate the infections in 4 cases, but these were not thoroughly treated.

3. The thickness of the salol coat of the ipecac pills must be carefully regulated so as to prevent vomiting on the one hand, and on the other, the passage of intact pills through the intestinal canal.

4. Probably the best dosage and method of administration is to begin with 60 or 80 grains at bedtime, and decrease the dose 5 grains daily until a dose of 10 grains is reached. Rapid cures may sometimes be effected by giving 40 grains three times during twenty-four hours.

5. The patient should be at rest in bed, and on a liquid diet; no solid food or milk should be given for at least six hours previous to the ipecac, and no liquids for three hours previous. No opiate is necessary.

6. Our experience indicates that a large proportion of amebic infections can be eradicated by ipecac treatment. It is far superior to any treatment that we have hitherto tested, and it should always be given a thorough trial before surgical treatment is attempted.

Vedder's<sup>2</sup> experiments showed that the action of ipecac on the ameba is much more powerful than on the dysentery bacilli. Amebas in a 5 per cent. bouillon culture were at all times killed by a fluid-extract of ipecac in a dilution of 1 to 50,000, and sometimes killed by even higher dilutions. In these experiments two varieties of amebas were used, one isolated from tap water and one isolated from the stool of a normal man. Vedder was unable positively to identify either culture, but is sure that neither of these varieties was either *Entameba coli* or *Entameba dysenteriae*. Vedder urges obtaining

<sup>1</sup> American Journal of the Medical Sciences, November, 1910.

<sup>2</sup> Bulletin of the Manila Medical Society, March, 1911.



an ipecac that is shown by actual analysis to contain its proper amount of emetin, and, when this is not possible, to insist on obtaining the Brazil root.

**Magnesium Sulphate.** From far-off India, Choksy<sup>1</sup> reports a series of cases of erysipelas treated with external applications of magnesium sulphate. He says the fact that the common and homely drug known as Epsom salt possessed any other property save the one usually associated with it was scarcely known up to within three years ago. The anesthetic effect resulting from its subcutaneous application, however, induced Tucker, of the Philadelphia General Hospital, to apply it for the relief of pain in local inflammatory conditions, with rather surprising results. For, apart from the relief of pain and discomfort, it was found that it controlled and eventually led to the cure of the inflammatory process. Numerous observations in *gonorrheal epididymitis* and *orchitis*, *gonorrheal arthritis*, *acute articular rheumatism*, *neuritis*, etc., gave equally satisfactory results. *Erysipelas* and *cellulitis* were the other affections in which a marked beneficial influence was observed from its local application. And further, on account of its antispasmodic and analgesic properties, magnesium sulphate has been administered by intraspinal, subarachnoid, and subcutaneous injections for the relief of spasm in *tetanus*, and also of the lightning *pains of locomotor ataxia*. Miller has reported 14 cases of tetanus so treated; 11 were treated with subarachnoid injections, and 5 of them recovered. The author says that magnesium sulphate brings about complete muscular relaxation. This prevents rapid exhaustion and enables the patient to take nourishment. The dose is 1 c.c. of a 25 per cent. sterile solution to each 25 pounds of the body weight of the patient.

In a further communication, Tucker has described its effects in 19 cases of *erysipelas complicated with alcoholism*, *acute nephritis*, *myocarditis*, *pneumonia*, etc., with but three deaths, and in 35 uncomplicated cases, without a single death. The latter recovered within two to seven days, pain and the usual local discomfort having been relieved in a few hours. The treatment has been applied by him and others in nearly 700 cases of various forms of inflammation with uniformly good results, and he claims the following advantages for it in almost all cases:

1. The drug can be obtained at any country store, is easily made into solution, is inexpensive, non-toxic, and clean; it is also easy of application if the directions are properly followed.
2. The patient promptly obtains relief from the distressing local symptoms usually present.
3. The temperature rapidly falls to normal, usually during the second twenty-four hours, and does not rise again, thereby eliminating the possible complications from fever.

<sup>1</sup> Lancet, February 4, 1911; Therapeutic Gazette, July 1911.

4. Internal medication is not indicated in uncomplicated cases, the only treatment being a milk diet for the first few days, or, to be more accurate, until the temperature reaches normal.

Choksy remarks, in conclusion, that he can confidently recommend to notice and trial this extremely cheap and efficacious method of treatment of erysipelas and cellulitis.

Five cases of *articular rheumatism* are reported by Jackson,<sup>1</sup> in which he had excellent results from the intramuscular injections of magnesium sulphate. Jackson gives the salicylates a chance first, but when they fail to give results he employs the magnesium sulphate treatment. He employs an all-glass Luer syringe of 5 c.c. capacity, observing all aseptic precautions, and selecting any muscle that is handy as the point of injection. He uses a 25 per cent. sterilized solution and injects 4 c.c. into adults.

**Nickel Sulphate.** This comparatively unknown agent Koplinski<sup>2</sup> has used successfully in a number of conditions. Nickel and cobalt, though closely related chemically and physically, and similar in toxic action, are widely different as germicides. As medicinal agents, nickel is active and variedly useful, while cobalt is apparently inert. Nickel sulphate was found to be potent as a germ-destroyer, and has an antibactericidal power. It was applied by Koplinski in several of the commoner *parasitic skin diseases* with success. Arrest of evolution and healing of the lesions resulted when it was applied in aqueous solution, in a strength of 1 to 2 per cent. It can be used as a wet compress, or mopped on or brushed on the skin and allowed to dry there. It was found by him to cure *impetigo contagiosa*, *pityriasis versicolor* or *chromophytosis*, *trichophytosis corporis* or *ringworm of the body*, and that other more obstinate form of eruption to treat, *eczema marginatum*. *Alopecia areata* showed a faint growth of very fine new hair at the end of a week, and at the end of six weeks a normal scalp and hair covering. In *acne vulgaris*, the author says, it is a good remedy applied locally several times a day, and where the subject is young and pale, as is commonly the case in this disease, it may also at the same time be given internally. The dose of nickel sulphate (the salt usually used) is 1 grain, after meals or food, three or four times a day. One-half grain will often achieve a good therapeutic action, but the larger dose is surer and as well borne. Two to 5 grains or more are so prone to cause severe nausea and vomiting that these quantities must be considered too large for practical use. The forms of administration are pill, tablet, and solution.

Other diseases in which he found nickel to exert a decided beneficial influence are: *Chorea*, *motor disturbance* with spasm and incoördination much unlike chorea, and *chronic neuralgia of the face*, *tic*

<sup>1</sup> New York Medical Journal, June, 1911.

<sup>2</sup> Monthly Cyclopedia and Medical Bulletin, Philadelphia, June, 1911.

*douloureux*, migraine of whatever form, *chronic enteritis*, *epilepsy*, *emotional* and *psychic weakness*, and *neurasthenia*. Koplinski is very enthusiastic over the medicinal virtues of nickel, basing his enthusiasm on personal observation as well as on the experiences of others.

**Phenol (Carbolic Acid).** The intravenous or subcutaneous injection of a 2 or 3 per cent. solution of phenol was introduced into the treatment of *tetanus* by Baccelli before the dawn of serotherapy, and he here states<sup>1</sup> that this method has amply established its efficacy. He tabulates the results obtained with it in 94 severe cases, reported by forty-eight different clinicians, and 38 very severe cases. The mortality was 2 per cent. in the first group, and from 19 to 15 per cent. in the very severe cases. He found that patients with tetanus are exceptionally tolerant of phenol, so that it is possible to increase the dosage from 0.3 or 0.5 gram to 1 or 1.5 gram, fractioned in the course of twenty-four hours, and keeping close oversight of the urine. He cites only the cases of which reports have been published in the international literature, a total of 190 cases since 1888. In 11 of the 16 fatal very severe cases the dosage had been manifestly inadequate, that is, below 1 gram, and in one of the others the patient had gangrene of the arm. The total mortality of the entire 190 cases was 17.36 per cent.

A number of reports by various writers are collected in the *Poly-clinico*,<sup>2</sup> dealing with the subcutaneous injection of phenol in the treatment of *tetanus* and *sciatica*. The reports all show the great benefits derived from the Baccelli technique in treatment of tetanus and sciatica, to supplement local measures. About 25 case histories are reported, with 5 of sciatica.

**Potassium Bichromate.** Six cases of phthisis treated by the internal administration of potassium bichromate are reported by Tombleson.<sup>3</sup> He gives the potassium bichromate in doses of  $\frac{1}{4}$  gr. (2.5 minims of a 10 per cent. solution in water), either alone or in a tonic mixture (phosphate, hypophosphite, or simple iron), such dose to be taken in a wine-glass of water after food, at first twice and later three times a day. The first dose, and possibly the second, may cause vomiting, but this does not matter, as, in his experience, toleration is easily established without missing a dose. The color of some of the mixture changes from yellow to green, but this seems in no way to impair the efficacy of the mixture. Of these 6 patients, the last 4 do not know they are under any special treatment. Improvement has been noticeable after the expiration of the first fortnight of treatment.

**Quinine.** Smith<sup>4</sup> made a series of researches to ascertain, if possible, the truth of the statement that quinine, like alcohol in excess, inhibits

<sup>1</sup> Berlin. klin. Woch., June 14, 1911, xxxi, No. 24.

<sup>2</sup> Rome, March 19, 1911, vol. xviii, No. 12.

<sup>3</sup> Lancet, London, November 12, 1910.

<sup>4</sup> Ibid., November 5, 1910.



phagocytosis, and is, therefore, contraindicated in septic conditions. The opsonic index was taken as a basis for the work, with the additional factor of a solution of quinine and morphine. The very soluble acid hydrochloride of quinine was selected because it is much less irritating than the sulphate, and contains 8 per cent. more quinine. Morphine hydrochloride,  $\frac{1}{8}$  grain, was added to each 10-grain dose of the quinine salt. It was roughly calculated that a 10-grain dose given to a person weighing 140 pounds, if entirely absorbed, would represent in the blood a proportion of 1 to 7500. The influence of this solution (1 to 7500, equivalent to a 10-grain dose) on the phagocytosis of the different kinds of pathogenic organisms (*e. g.*, streptococci, staphylococci, pneumococci, *Bacillus coli*, *Bacillus influenzae*, *Bacillus pseudodiphtheriae*, and *Bacillus tuberculosis*) was contrasted with stronger and weaker solutions to ascertain the effect of varying doses. In the majority of the eleven sets of experiments, there was an increased phagocytosis, always most marked with the 10-grain dose solution. Instead of inhibiting phagocytosis, the addition of quinine and morphine, in what may be considered the "ideal" dose, greatly increased it. Smaller doses in all the groups were less effective, and one important fact was clearly demonstrated, namely, that very large doses (30 to 40 grains), instead of increasing, actually diminished phagocytosis, sometimes to the extent of 50 per cent.

*The Indian Medical Gazette*<sup>1</sup> contains a paper by Acton dealing with the *rationale of quinine prophylaxis*. He asks the question, What beneficial results are obtained from the giving of quinine to produce immunity in those exposed to malarial infection? From the scant data he has in his possession, it will be seen that this method, if employed alone, cannot absolutely control an epidemic, but among troops and in jails it can:

1. Decrease the number of malarial cases by from 50 to 80 per cent. at the very most, and this only when the dose is given regularly and in an adequate manner.

2. It undoubtedly decreases the gravity of the cases, and hence among troops we get a very low mortality. In Peshawar, during the severe epidemic of malignant tertian in 1908, very few cases of the pernicious type were observed in the regimental hospital compared with those seen in civil practice. While the so-called "Peshawar fever" (pernicious malignant tertian, with vomiting and passing of blood) is rarely seen nowadays, judging by the mortality it must have been extremely common and virulent in former times.

3. By decreasing the actual number of cases, it would, of course, limit the extent of the infected feeding grounds for the anopheles to browse upon. But in regimental lines the women and children are not treated efficiently, and consequently always form potential foci for an

<sup>1</sup> August, 1910.

epidemic to occur. In a like manner, the cases harboring sporonts in the blood should always be isolated until their blood is declared free of crescents.

So it will be seen that this method, if properly and systematically carried out, will further reduce the number of cases among the soldiers and sepoys. At the same time, the infectious nature of this fever should be more widely recognized, and all cases harboring crescents should be segregated at night by mosquito nets; in fact, they ought to be regarded in the same light as chronic bacillary carriers.

In an excerpt from the *Archiv für Hygiene*, cited in the *Edinburgh Medical Journal*, Graziani reports some investigations made by him regarding the *possible danger of continuous administration of small quantities of quinine as a prophylactic against malaria*. He administered quinine hydrochloride to rabbits and guinea-pigs in dose proportional to that used for man in the prophylaxis of malaria. As a result, he found that the growth of quinized animals was distinctly impaired as compared with control animals receiving only injections of physiological salt solution. Apart from this interference in growth quinine had apparently little action. It appears from Graziani's experiments that any prolonged use of quinine is by no means an innocuous procedure, as it may prevent the growth of young animals, and subsequently lower their power of producing immune bodies and of resisting microbic infection.

**Salicylates.** That there is a prevailing tendency in medicine of late years to minimize the empirical use of drugs, and to rely more largely upon intelligent aid to nature by physical means, cannot be denied. But even the most ardent "therapeutic nihilist," as a rule, acknowledges the value of certain drugs at times, and among these the *salicylates* as a remedy *in acute articular rheumatism* have occupied a prominent place.<sup>1</sup>

I called attention in *PROGRESSIVE MEDICINE*, 1909, to the large doses of salicylates administered in the treatment of acute articular rheumatism. To be effective in this disease, doses of from 100 to 150 grains in the twenty-four hours should be given, and some have advised amounts twice as large.

*Hypodermic injections of the salicylates in rheumatism* are advocated by Seibert.<sup>2</sup> In acute rehumatic infections of joints, heart, pericardium, pleura, and central nervous system (chorea), he injects 10 c.c. of a 20 per cent. sterilized solution of sodium salicylate to 100 pounds of body weight. This is injected fifteen minutes after an appropriate cocaine solution had been injected under the same spot. If the injections are made earlier than this they cause considerable pain. This dose should be repeated every twelve hours. In severe cases with multiple lesions

<sup>1</sup> Journal of the American Medical Association, June 24, 1911, p. 1884.

<sup>2</sup> Medical Record, March 11, 1911.

he advises an increase of the dose to 15 c.c. of the solution to 100 pounds of body weight. Smaller doses than these will be without effect. Joint stiffness, pain, fever, and pulse rate diminish and the general condition of the patient improves, he says, within three hours after the first injection. If the injections are continued regularly every twelve hours, the improvement also continues; but if they are omitted for twenty-four hours in severe cases, the symptoms will grow worse. In the milder cases the improvement may continue even without a repetition of the dose. In chronic cases, 10 c.c. to 100 pounds of body weight of the following oily solution are injected every twenty-four hours. This mixture contains salicylic acid, 10 grams; sesame oil, 80 grams; pure alcohol, 5 grams; and gum camphor, 5 grams. This oily solution is sterilized before the alcohol is added, but must not be exposed to the air, as the alcohol will evaporate and the salicylic acid crystals will precipitate. The effect of the injection in chronic cases is obtained more rapidly when multiple localizations of the rheumatic process are present than when one joint is affected. In the former, pain and stiffness usually improve after the first injection; in the latter, after the third. The addition of camphor (from 5 to 20 per cent.) has been found beneficial in stimulating the heart when the pericardium or the endocardium is involved. One of the chief advantages of this method is the entire absence of all the toxic symptoms that are sometimes seen when salicylates are given by the mouth. Seibert gives the details of the technique of this procedure in his article, and states that he has seen no local or general untoward effects resulting from the injections.

Some remarkable cases of extremely rapid cure of acute rheumatism of the joints after treatment with *intra-articular injections of salicylate of soda by the electrical method* are recorded by Wullyamoz,<sup>1</sup> of Lausanne. If the results are confirmed in a large number of cases, we have here what Wullyamoz calls a "treatment by assault" for this condition. The first observation relates to a patient who had suffered severely on three previous occasions from acute rheumatism, and had been treated by the routine drug method with salicylates. At each attack the treatment lasted from six weeks to three months. In his latest illness the salicylate treatment produced no amelioration to speak of, and at the end of a month the patient could scarcely move, and showed an icteric tint and signs of dyspnea. A cataphoretic course of treatment was then determined upon. The whole surface of the body was first washed so as to relieve the pores of any grease that might oppose a resistance to the ions and the electrical current, and on the following day the first sitting was given. Large electrodes of 1 meter in length and 20 centimeters in width were employed, and over the whole extent of the one which served as the cathode was spread, not a solution of salicylate of soda, but, for the sake of simplifying the procedure, the powdered form of that

<sup>1</sup> British Medical Journal, August 13, 1910.



substance. This was rubbed over the surface with the hand in such a fashion as, with the humidity of the electrode, to form a paste. The cathode was then applied to the leg, the base of the electrode resting upon the swollen instep, and the upper part covering the hip region, while the anode was placed on the posterior side of the leg. The upper extremity was dealt with in the same manner. A sitting of one-half hour was given for each of the affected limbs in turn. Two days afterward the swelling had left the knee and the right hand, but the left foot was somewhat painful. Another sitting was given, and after a further forty-eight hours the patient was able to walk without assistance, and to obtain a good sleep, which had been denied him for fifteen days previously. The cure was absolutely complete ten days after the commencement of cataphoretic treatment, and after five sittings. He gives the detailed treatment of two other similar cases with this method, with very happy results.

The fact upon which the author lays particular stress is the rapid and definite fall of the fever in these cases. In the second of them, the temperature fell from 39.6° to 37.1° C. in less than twenty-four hours; and in the third, from 38.6° to 37° C. in less than three hours. As to the manner in which this medicamental electrolysis effects its results, the author makes some interesting deductions.

Stark, in the *Practitioner* for March, 1911, speaks of the antipyretic properties of sodium salicylate. The best prescription, in his opinion, for the treatment of "common cold," or *nasal catarrh*, is the following:

R—Sodii salicylatis . . . . .	gr. x
Spiritus ammoniæ aromatici . . . . .	f℥ss
Tincturæ belladonnæ . . . . .	℥v
Aquæ chloroformi . . . . .	q. s. ad f℥j—M.
Sig.—Every four hours.	

In the most common type of *influenza*, with very sudden onset, severe headache, acute pain in the limbs, and a furred tongue, sodium salicylate is the best drug to use. He affirms, from frequent and severe personal experience of the disease, that to give quinine to a patient who presents the above clinical picture is to add to his discomfort. After a mercurial purge, administration of the following cuts short the disease in two days:

R—Sodii salicylatis . . . . .	gr. x
Potassii bicarbonatis . . . . .	gr. x
Tinctura nucis vomicæ . . . . .	℥x
Aquæ chloroformi . . . . .	q. s. ad f℥j

It is a common experience of many practitioners to meet with cases, especially in children, in which the only symptom is sudden high temperature. Careful examination reveals nothing abnormal, and past and

future history shows no cause for the pyrexia. Some of these cases are possibly rheumatic, but Stark believes that a considerable number are due to the absorption of some pyrexia-producing body from the intestinal content. At all events, the administration of a few grains of sodium salicylate quickly restores the patient to the normal state. For diarrhea and sickness of young children, salicylate of sodium is almost a specific. Two grains may be given, in water, to a child of nine months, and repeated at intervals of from two to four hours, according to the severity of the disease. The drug may be made palatable by the addition of a little saccharine and chloroform water. Vomiting in most cases ceases after the first two doses, and the stools rapidly become less offensive and abundant. There is no after constipation, as is so often the case when astringents are used, and the characters of the motions are not masked, as they are by the use of bismuth salts.

In *mumps* attended by rise of temperature and severe pain, Stark considers sodium salicylate the most effective remedy; he has used it freely in two epidemics of mumps, and has found it most valuable. Its excretion in the saliva, with its antiseptic action on the unknown bacteria of the disease, probably accounts for its action. It should be combined with an alkali, as follows:

R—Sodii salicylatis . . . . .	gr. v
Sodii bicarbonatis . . . . .	gr. v
Saccharini . . . . .	q. s.
Aquæ . . . . .	q. s. ad f3ss—M.

Sig.—Every two to four hours.

Glaesgen<sup>1</sup> advises the administration of twice as much of an alkali as of the salicylate to neutralize the possible injurious action of the salicylates on the kidneys.

**Santonin.** In a note published in the *Semaine Médicale* and cited in *Union Pharmaceutique* for January, 1911, attention is called to the *danger attending the administration of santonin to young children*. It is a drug which should not be given to children under two years of age. For older children, it may be prescribed in doses of  $\frac{1}{3}$  to  $\frac{1}{4}$  grain. In combination with castor oil, it appears to cause some of the poisonous symptoms observed with oleoresin of aspidium and castor oil, causing complete prostration and blindness. A case is noted in which a dose of one-half grain of santonin had been given in castor oil to a girl, aged five years, for the expulsion of *ascaris lumbricoides*. The first dose was immediately rejected by the stomach. A second dose was administered in about two teaspoonfuls of castor oil, and the medicine acted eight hours afterward, bringing away a large number of worms, but alarming symptoms developed, the child being completely prostrated

<sup>1</sup> Münch. med. Woch., May 23, 1911.

for two days, during which she never stirred her limbs or moved her eyes. On the third day she began to show signs of recovery, but it was noted that she had completely lost her sight. She afterward recovered her sight, but in spite of every care and attention several months elapsed before she was completely well.

Walterhoefer<sup>1</sup> finds that santonin produces no therapeutic effect of importance upon the excretion of sugar in diabetes.

**Scarlet Red.** Davis<sup>2</sup> states that scarlet red and its component, amido-azotoluol, will not heal every wound, but in the majority of cases, when applied with the proper technique, they will cause epithelial stimulation in the edges of the most sluggish wounds, and bring about a rapid healing which is stable and resistant, and which has the macroscopic and microscopic appearance of normal skin. There is no tendency to subsequent contraction, and the skin becomes movable on the underlying tissue in a reasonable time. Any one of these characteristics would make the use of these substances well worth trying.

**Serum Therapy.** ANTIDIPHThERIC SERUM. While regarding anti-toxic serum as a specific, Goodall<sup>3</sup> believes there are certain limits to its use. He believes in the importance of early treatment, but has modified his earlier view that the limit of its use is the limit of dosage. After the introduction of this serum, and later the sera of tetanus, the streptococcus, and enteric fever, a symptom complex was found to occur after serum injections in a number of cases. This has been called "*serum sickness*," and has been found to be due to the serum itself, and occurs in about 33 per cent. of the cases treated. The general symptoms are fever and a rash, usually urticarial in nature. Other and more severe symptoms were observed in 3 to 4 per cent. of the cases, namely, acute pain and swelling of the joints, pain in the tendons and fascia. These general symptoms rarely set in before one week after the serum injection, and sometimes three weeks. The fever, rash, and occasional arthritic symptoms are known as the "normal reaction," and are due to the horse serum. It is known that the sera of other animals can give rise to the same effects. In the great majority of cases, the normal reaction, while unpleasant, is not dangerous. "Abnormal reactions" were next recognized, and divided into those following a second injection of serum, and those following a primary injection. Abnormal reactions following a second injection have the usual incubation period of at least one week.

This reaction is unusually severe and abrupt. There is faintness and much swelling of the body surface and the mucous membranes from the urticaria.

A second type of this class exhibits an incubation period shorter

<sup>1</sup> Berlin. klin. Woch., March 6, 1911.

<sup>2</sup> Annals of Surgery, May, 1911.

<sup>3</sup> British Medical Journal, 1911, No. 2615, p. 292.



than usual, from twelve hours to six days. This is termed "accelerated reaction," and exhibits severe urticarial swelling, vomiting, prostration, and swelling of the joints. In a third type of this group, called "immediate reaction," the serum reaction appears within a few minutes to five or six hours after the injection, and exhibits an explosive suddenness, high temperature, cyanosis, and rigor. From these facts, therefore, it is deduced that in certain persons injection of a foreign serum leads to increased susceptibility to that serum if repeated. "Abnormal reactions" following the first injection are more severe and often fatal. Gillette collected 30 cases of this kind, 16 of which were fatal. Most of them occurred in the United States. Twenty-two in this series were subject to asthma of some form or other. The symptoms of this class of cases are usually intense dyspnea, failing respiration, with cyanosis and collapse. They occur shortly after the injection. Goodall believes that an indiscriminate use of the serum as a prophylactic is unjustifiable. A delay of a day or two in doubtful cases not laryngeal is justifiable. In undoubted diphtheria he would hesitate to give the serum only when the patient is asthmatic. If the disease is severe or the larynx is involved, the choice between the two evils would be to give the serum and risk the possible hypersensitiveness. The earlier the treatment in any case, the smaller the dose necessary. Large doses of calcium lactate tend to mitigate the rash of serum sickness.

Wallace<sup>1</sup> warns that individuals peculiarly susceptible to the odor of horses or stables, and those subject to asthmatic attacks, hay fever, and bronchitis, should have horse serum administered only upon most urgent cause, and then with due prophylaxis. Insufficiency or inadequacy of the suprarenal glands may account, in the asthmatic type, for the peculiar reaction. He suggests the administration, hypodermically, of aqueous extracts of the suprarenal glands previous to the use of serum in this class of cases as desirable, in order to rehabilitate and control the vasomotor system, and thinks it should prove of great prophylactic value, as well as useful in the heroic treatment of the acute attacks of "serum disease."

Cumberlege<sup>2</sup> is in favor of *oral administration of diphtheria antitoxin*, for the following reasons: Results are obtained within a few hours after being given, a far smaller dose is required (Cumberlege has never given more than 4000 units at a time; a dose of 2000 units, followed up, if necessary, by a further dose, is the usual amount given). By giving it in this way, it is possible to give continued dosage by making a mixture and ordering it to be given every two or four hours, as the case may be. Another point in its favor is that no patient treated by him by mouth has shown signs of serum sickness, whereas either a rash or joint pains, or both, have nearly always occurred after the few injections given.

<sup>1</sup> Medical Record, January 7, 1911.

<sup>2</sup> British Medical Journal, July 8, 1911.

ANTITETANIC SERUM. There were only 18 cases of tetanus reported this year resulting from the Fourth of July casualties;<sup>1</sup> 54 less than last year, and the lowest number reported during the nine years the *Journal of the American Medical Association* has been gathering these statistics. Last year there were 72 cases, and 150 in 1909. It is a significant fact that the number of blank cartridge wounds shows a correspondingly large decrease—from 450 last year to 169 this year. The most common cause of the wound is the blank cartridge, and the most common site is the hand. Of the 20 lockjaw patients, all but one were males, and all but 3 were under eighteen years of age. The youngest was four years old, the oldest was forty, and the average age this year was fourteen years.

So far as reports were received, tetanus antitoxin was employed in 7 of the 18 cases reported this year, but in no instance, according to the reports, was it employed until after the active symptoms had set in. This is unfortunate, as tetanus antitoxin is so valuable as a prophylactic that very few cases have ever been reported in which active symptoms began after the administration.

Blank cartridges continue to be responsible for the great majority of tetanus cases, 15, or 83 per cent. this year being due to that cause, as compared with 88.9 per cent. last year, and 86.5 per cent. in 1909. Two cases of tetanus this year were due to injuries by firecrackers, and 1 to a bomb. Of the 18 cases of tetanus from Fourth of July injuries this year, 10, or 55 per cent., ended fatally, as compared with 93 per cent. last year, 84 per cent. in 1909, and 72 per cent. in 1908.

Besides the cases of lockjaw due directly to the use of fireworks, it is interesting to note also those occurring during the Fourth of July season which were due to penetrating wounds from other causes, such as nails or splinters, to crushing injuries, etc. There was, likewise, a marked reduction in these cases, only 29 being reported during the Fourth of July season this year, or less than half the number of last year, when 47 were reported. In Table I is recorded the number of deaths from tetanus from 1903 to 1911.

TABLE I.—CAUSES OF TETANUS CASES

Year.	Blank cartridge.	Giant cracker.	Cannon.	Firearms.	Powder, etc.	Total.
1903 . . . . .	363	7	5	3	27	415
1904 . . . . .	74	18	5	1	7	405
1905 . . . . .	65	17	4	5	13	104
1906 . . . . .	54	17	1	7	10	89
1907 . . . . .	52	8	6	4	3	73
1908 . . . . .	58	5	4	3	6	150
1909 . . . . .	130	9	1	4	6	150
1910 . . . . .	64	2	0	5	1	72
1911 . . . . .	15	1	1	0	1	18

<sup>1</sup> *Journal of the American Medical Association*, August 26, 1911 (special article).

Besides the 10 deaths due to tetanus, 47 persons were killed by various forms of fireworks, making a total of 57 deaths, 74 less than last year and 158 less than in 1909. This is the lowest number of deaths from such causes during the nine years that the *Journal of the American Medical Association* has been compiling these statistics, and shows a very decided improvement over previous years. This year 11 people were killed outright by firearms, 9 by explosions of powder, bombs, or torpedoes, 5 by cannon, 2 by giant firecrackers, and 8 by various causes, as blood poisoning, explosions of chemicals, etc. The largest number of deaths due to any cause was 12, mostly little girls, who were burned to death by fire from fireworks, in several instances from the so-called "harmless" varieties, including very small firecrackers and sparkles.

Table II shows the number of deaths which occurred from causes other than tetanus from 1905 to 1911.

TABLE II.—CAUSES OF DEATHS NOT DUE TO TETANUS

Year.	Gunshot.	Fire from fire- crackers.	Powder, torpedoes, etc.	Giant crackers.	Cannon.	Other causes.	Total.
1905 . . . . .	37	23	6	5	7	17	95
1906 . . . . .	38	18	18	3	3	3	83
1907 . . . . .	20	31	13	13	3	22	102
1908 . . . . .	30	22	19	23	7	7	108
1909 . . . . .	17	37	16	7	7	6	90
1910 . . . . .	19	26	11	2	3	3	64
1911 . . . . .	11	12	9	2	5	8	47

The editorial concludes by saying that the responsibility for the vast majority of Fourth of July injuries clearly rests with city governments, since the employment of death-dealing methods of celebration is subject to their regulation. It is, therefore, up to the city governments to decide whether or not the maiming of thousands, the agonizing deaths from lockjaw, and the burning to death of little children by fire from firecrackers are to be continued. Prohibitory ordinances are most effective and permanent, as shown by the results in Baltimore, Washington, Cleveland, Trenton, and other cities, and even restrictive ordinances, if enforced, are quite effective, as shown by the results in New York, Boston, Chicago, Toledo, and elsewhere.

**BLOOD SERUM.** The *Archives of Pediatrics*<sup>1</sup> reminds us that with the newer and more perfect technique for the direct transfusion of blood from one human being to another, the resurrecting of which we owe to Crile, the procedure has been used with a view of curing bleeding in the newly born, and with considerable, often brilliant, success. However, fatalities have occurred, and the procedure cannot be accepted as entirely free from danger. Similarly, the injection of a foreign serum for a

<sup>1</sup> September, 1910.



like purpose of checking hemorrhage, while often successful, yet carries with it the possibilities of serum sickness and anaphylaxis.

Welch regards the intravascular destruction of transfused blood corpuscles, and the occurrence in the marrow of leukocytes engulfing one to several red blood cells, as evidence that the transfused corpuscles are foreign material merely, and not essential to such accidents as occur by embolism or thrombosis. He, therefore, has investigated the value of the injection of normal human serum, in cases of hemophilia neonatorum, with results which promise much.

He reports 8 cases, only one of which died, and in this case the death was due to persistent atelectasis forty-nine days after all bleeding had ceased, and at autopsy none of the tissues showed signs of bleeding. The hemorrhage ceased usually after two or three days of injections, in several cases immediately upon beginning the injection treatment. The amount injected varied from 6 to 10 c.c. to a dose, and from 10 to 65 c.c. per diem. The temperature, which was elevated during the continuance of the bleeding, and the loss in body weight, which was, of course, rapid during the bleeding, were promptly checked. In 3 cases, a prompt gain in weight took place.

The apparatus which Welch uses consists of an Erlenmeyer flask, stoppered with a rubber stopper, through which pass two tubes: (1) A straight tube drawn to a fine point and filled with cotton and equipped with a rubber tube, such as is used for drawing blood up into a hemacytometer pipette. (2) A U-shaped tube, fitted with a needle, which is cotton-plugged into an arm vein; the blood may be drawn into the flask by suction and allowed to coagulate. When the serum has separated it may be used.

Welch is convinced that the injection of normal human serum never gives serum sickness nor causes anaphylaxis, and further believes that it is actively bactericidal, and cites its use in a case of streptococcemia in which the injection of 50 c.c. of serum apparently brought about a subsidence of the temperature and a clearing of all bacteria from the blood.

One phase of the employment of normal human serum which Welch alludes to, and which a survey of his cases suggests, should attract the attention of the pediatricist. It is the rapid gain in weight of some of the cases and the fact that the serum is physiologically a perfect food. So many children die during acute illness because, with the affection of lung or ear or meninges, the digestion is depressed, and even the weakest food cannot be converted into substances which can be utilized by the body tissues. Notorious is the falling away of children subsequent to the intestinal affections of summer, when the stools have cleared, the temperature subsided, and the toxemia disappeared. There surely is a field among these cases for the use of this serum.

Beach<sup>1</sup> notes that Weil, in the course of his study of hemophilia, took advantage of the facts shown by Schmidt to the effect that fibrin ferment exists in great abundance not only in the clot formed on coagulation of the blood, but also in the separated serum, and controlled hemorrhage by increasing the coagulability of the supposed blood by the injection of fresh animal serum. In some cases diphtheria antitoxic serum has been used without striking success because, as Weil shows, the fibrous ferment in the blood begins to decompose in about two weeks, and from that time on becomes progressively less active. The usual time elapsing from the bleeding of a horse until the antitoxic serum leaves the laboratory is about twelve weeks. Thus, this serum is not adapted to the production of this reaction. Weil observed that the blood serum of any animal would produce the shortening of the coagulation time of the subject's blood when introduced either under the skin or directly into the veins, but that, with the exception of horse and rabbit serum, they were toxic to human beings.

The rabbit serum is obtained directly from the left ventricle. Usually 30 c.c. may be prepared from the blood of one rabbit. The time elapsing from the moment the blood is drawn until it is ready for injection is usually less than one and one-half hours. The dose for the adult is 30 c.c. subcutaneously. This amount is placed in two syringes and injected on each side of the abdomen about three inches from the umbilicus. The site of the injection bears no relation to the effect on the hemorrhage. In cases of extreme urgency, the serum may be given intravenously in 15 c.c. doses. The application of the serum to the bleeding surface causes coagulation, and advantage may be taken of this fact in the treatment of some hemorrhages. Very soon after the injection of the serum the coagulation time begins to decrease, and it is usually over two weeks before the effect begins to wear off.

Leary reports 20 cases treated satisfactorily by this method. Beach reports 8 cases, 3 in which the serum was used as a prophylactic and 5 as a curative. Two of the latter were hemophiliacs.

**SERUM TREATMENT IN PLAGUE.** Sinclair<sup>2</sup> reports 3 cases of plague treated with the Yersin-Roux serum. In one case the serum failed to accomplish a cure, in the second case one injection sufficed to give good results, and in the third case two injections were necessary. The serum used in these cases was that known as "dry serum," and was made by the Pasteur Institute. He believes that this is far superior to the liquid serum, and it may be that the liquid serum is responsible for the poor results reported by some observers. The dry serum is difficult to dissolve if one is not familiar with it. The main point is to have a test-tube with just sufficient water to moisten its sides, no more. The dry serum is dropped from the glass capsule in which it comes, so that

<sup>1</sup> Yale Medical Journal, June, 1910.

<sup>2</sup> Journal of the American Medical Association, vol. lvi, No. 5.

the particles of the serum, which adhere readily, form a layer of only one particle in thickness on the side of the tube. Then sufficient water is added to make the necessary 10 c.c. of serum. Heat should never be employed, but as much time taken to cause the particles to dissolve by gently shaking as is necessary. A stirring rod should not be used unless the tube is held over another vessel to catch the serum and preparations are made to filter broken glass from the solution.

**ANAPHYLAXIS.** In connection with the injurious effects of serum injections, Bokay<sup>1</sup> approves the term "serum sickness" applied to this condition by v. Pirquet and Shick, who described it as a definite clinical picture. Besides the skin affections are found fever, pain, and swelling in the joints, localized edema, and albuminuria. Instances of this condition since 1894 indicate that the first signs of this condition appear from eight to ten days after the injection of the serum. However, some cases arise in which these reactions to serum occur much more rapidly, even immediately after the injection. Von Pirquet, Shick, and others have shown that this "accelerated reaction" occurs usually where a condition of "anaphylaxis" exists. There is no doubt that anaphylaxis often causes unpleasant symptoms, and the possibility of serum sickness should always be considered at the bedside, when, after an interval, serum injection is again necessary. This is especially true, since all these sera are derived from the horse. Wolff-Eisner has indicated the elimination of anaphylaxis by using serum from another species of animal. Bokay thinks it would be wise if, in the future, diphtheria antitoxin were prepared not only from the horse, but from other animals, as the sheep, cow, and ass. The "accelerated reaction" to serum, Bokay thinks, indicates a previous inoculation of the patient with serum from the same species. He reports 2 cases of diphtheria in children of different families. Neither child had ever had any serum injection. They were both injected with the same quantity of a serum which was prepared at the same time from the same horse. Within a few minutes after the injection both children broke out in a severe urticarial eruption, covering the face and scattered over the body. This rash faded within a day. These cases cannot be explained on the ground of anaphylaxis. In 1908 about 10 per cent. of cases occurring in Bokay's observation developed serum sickness, and in 1909 there was 23 per cent. In the month of January, 1911, out of 23 cases, 50 per cent. developed a serum exanthem. In all these cases the disease appeared as usual about eight or ten days after the injection. The serum used for these cases came from one lot derived from the same horse. Bokay thinks the cause of the serum sickness in the two children above described was due to some individual element of the horse from which the serum was derived.

The *treatment of anaphylaxis* formed the subject for an editorial

<sup>1</sup> Deutsch. med. Woch., 1911, xxxvii, 9.



in the *Therapeutic Gazette*.<sup>1</sup> It is pointed out that a number of investigations have been made which would indicate that atropine, if it does not actually relieve the symptoms of anaphylaxis, will at least ameliorate them. Although in the very acute cases it is probable that no drug has an opportunity to do good, nevertheless in the cases which do not reach a fatal termination within a few minutes atropine seems to be one of the remedies to be relied upon.

It is interesting in this connection to call attention to some experiments carried out by Auer and reported to the American Physiological Society at its recent meeting. Employing rabbits for his investigations, he found that the early symptoms were characterized by a marked slowing of the respiration and clonic and tonic convulsions, the heart beating some minutes after the convulsion ceased and after respiration stopped. Autopsy in these animals showed the gut to be pale, with no hemorrhages, and the splanchnic vessels well filled. The lungs were collapsed, but, nevertheless, showed traces of pulmonary edema. A very characteristic condition is the distention of the heart with blood, especially the right ventricle, and the ventricular muscle does not respond to mechanical or electrical stimulation, although the auricles can usually be found beating regularly. By various experiments Auer excluded the influence of the centric nervous system and that of the splanchnic region, and found that the blood pressure fell under these circumstances as readily as in intact animals. He believes that the primary underlying cause of anaphylactic death in rabbits lies in the heart itself. For this reason it may be well to combine with the atropine an intramuscular or intravenous injection of digitalis. While both of these drugs may fail, our present knowledge would seem to indicate that they offer better results than any other line of treatment.

**Silver Nitrate.** Although *suppurative otitis media* has become less frequent since the operation for the removal of adenoids, and the early treatment of the acute cases of suppurative ear trouble has become more general, many such cases, both acute and chronic, still exist and require treatment. In the absence of urgent symptoms, conservative measures are tried, and the variety of these shows the difficulty of attaining the desired result, which is drainage and the cessation of secretion.

To obviate, in a measure at least, this difficulty, Richards<sup>2</sup> has for some time been using silver nitrate in these conditions. The method is as follows: Cleanse the suppurative area as thoroughly as possible, doing this very carefully, by means of syringing, wiping, and suction, as may be needed, and removing any polypi, granulation, or debris that may be present. If the perforation is very small, enlarge it, but in the cases

<sup>1</sup> April 15, 1911.

<sup>2</sup> Boston Medical and Surgical Journal, September 8, 1910.

in which he has used the silver this has not been necessary. Lay the patient's head over so that the affected ear lies uppermost and absolutely horizontal. Instil with a dropper a sufficient quantity of the nitrate of silver solution to nearly fill the external canal. Keep the head in the horizontal position for five minutes, then dry the canal thoroughly, and put in a light wick of cotton or gauze. The writer begins with a 3 per cent. silver solution, and, if necessary, gradually increases until he uses 20 per cent. As the silver does not penetrate very deeply, owing to its forming a coagulum at the point of application, it will in most instances have to be used a number of times. Few patients will object to this, and will almost always prefer to make trial not only of one but many methods of local treatment before consenting to the radical mastoid operation or even to ossiculectomy. The treatment is reported from every other day to once a week, according to the nature of the case and the ability of the patient to follow up the treatment. As a rule, the application is painless. The author does not by any means claim that this method is always successful or that it displaces the radical operation. It is simply one of many procedures that may be tried in these cases, and it has the advantage that by gravity the silver solution is brought into very nearly direct contact with all the diseased area.

Smith<sup>1</sup> speaks of 3 per cent. silver nitrate colon irrigations in the treatment of infants ill with *infectious diarrhea*. There were two distinct types of cases in which silver nitrate injections were used. First, the early acute cases, seen during the active period of the disease; second, the subacute or chronic cases, in which blood and pus persisted in the stools after the elevation of temperature and toxemia had disappeared. In the acute cases the only methods of estimating the value of the treatment are: (1) To judge between the course of the particular cases under operation and what might be expected the course of that case to have been without treatment; or (2) to compare a large series of cases treated by this method with other series not so treated. This is an unsatisfactory means of judgment, but it is the best we have, and the one commonly employed in determining the value of various therapeutic agents. In the chronic cases it is easier to show a relation of cause and effect between the treatment and the subsequent history of the case, because if blood and pus promptly disappear from the stools after the use of a silver nitrate injection when they had been present constantly up to that time, it seems reasonable to conclude that the treatment was of benefit.

**Sodium Citrate.** Lichtwitz<sup>2</sup> advocates sodium citrate in place of sodium bicarbonate for the treatment of *acidosis*. He claims that sodium citrate is practically tasteless, and may be added to food and also given dissolved in water, with the addition of lemon juice. When

<sup>1</sup> Boston Medical and Surgical Journal, March 2, 1911.

<sup>2</sup> Therap. Monatshefte, 1911, xxv, 81.

given in this way it makes a very pleasant drink. Sodium citrate causes much less disturbance to the digestion than sodium bicarbonate. He has given sodium citrate up to 50 grams a day; it has not caused diarrhea, that sometimes results from large doses of sodium bicarbonate. He also adds that it is theoretically possible to give sodium citrate solution by subcutaneous injection, while the strong alkaline reaction of sodium bicarbonate solution prevents its use subcutaneously. However, he has had no personal experience with subcutaneous injections with sodium citrate.

**Vaccines.** ANTITYPHOID VACCINE. I have discussed this subject from several points of view in *PROGRESSIVE MEDICINE* for 1910. During the last year several important papers have appeared in the literature dealing with this topic.

Gosman<sup>1</sup> gives a brief résumé of the literature on inoculation for typhoid fever, and the preparation of the vaccine and the method of its use. In concluding, he says that it seems that the present status of these inoculations against typhoid fever is that they are valuable as a method of preventing the disease, and are, perhaps, the most valuable single asset we have in combating an epidemic, and that there is surely no doubt in the minds of most thinking and up-to-date medical men that they should be used in the following classes of persons: First, all nurses, ward attendants, hospital corps men, Red Cross assistants, physicians, and medical students; also all persons who contemplate a journey into a section where typhoid fever is known to exist or is suspected of existing. The inoculations should also be done generally in districts suffering from an epidemic, and especially in the families where a case exists; and in time of war all volunteers at camps of concentration should be inoculated as soon as possible after the camp is started. Gosman is convinced of the harmlessness and, at the same time, of the effectiveness of this procedure.

The last report of the Surgeon-General of the Army adds more evidence to the already overwhelming testimony in favor of the protective value of antityphoid vaccination. The figures given for the fiscal year ending June 30, 1909, showed an incidence of typhoid fever sixteen times greater among the unvaccinated than among the vaccinated troops.<sup>2</sup> Up to October 1, 1910, only 5 cases had developed among the immunized as against 418 among the non-immunized. Moreover, of these 5 cases, 4 were so mild as to leave doubt as to the diagnosis, and there were no bad effects of any kind as a result of the vaccination.

A step has already been taken in the direction of antityphoid vaccination by the Public Health and Marine Hospital Service. According to instructions recently issued, officers are required to practise antityphoid vaccination on all beneficiaries of the service who may desire

<sup>1</sup> *Journal of the American Medical Association*, 1910, vol. Iv, p. 1169.

<sup>2</sup> *Annual Report, Surgeon-General, United States Army*, 1910.



it.<sup>1</sup> Speaking in general terms, these beneficiaries include all seamen or persons employed in any capacity on any licensed vessel of the United States except enlisted men in the army and navy. Sailors on both inland waters and high seas are, from the roving nature of their calling, especially liable to exposure to typhoid infection. Thus, they frequently become carriers of the disease and a menace to the general public. In view of these facts, the recent action of the Public Health and Marine Hospital Service should be regarded as a measure directly calculated to preserve the public health.

Richardson and Spooner<sup>2</sup> report 1588 inoculations upon 405 nurses in various training schools for nurses in Massachusetts. As yet there have been no untoward results, and they believe that the inoculated individuals have acquired an increased resistance to typhoid fever that will last for several years at least. They expect in the coming year to extend the influence of these inoculations, especially among nurses and those attendant upon the sick. Furthermore, they have strong faith that the procedure will, within a short time, find increasing favor with the general public, which, exposed as it is to many sources of infection, is in great need of specific protection.

Anders<sup>3</sup> discusses the results obtained by different clinical observers with the use of vaccines in the treatment of typhoid fever. These results are extremely variable, some writers reporting favorably, and others finding either no specially striking effects or entirely negative ones. Anders reports 8 cases treated with vaccines, with no striking results. Small doses of vaccine were employed, namely, initial doses of 25,000,000, and subsequent ones of 50,000,000 each. These injections were repeated at intervals of seventy-two hours. The author believes that phagocytosis probably plays an important role in the cure of typhoid fever, and, therefore, a vaccine, should stimulate an increased leukocyte count. He found that the doses of vaccine he employed did not appreciably increase the leukocyte count. Anders concludes by saying that the value of vaccines for the following purposes must be conceded: (1) As a means of prophylaxis; (2) in suitable cases when continued during convalescence to prevent relapses; (3) to combat local infections with the typhoid bacillus, as, for example, bone suppurations, which arise in the period of convalescence; and (4) for the removal of the typhoid bacilli from the feces and urine in the case of typhoid carriers.

Stoner,<sup>4</sup> in his résumé of vaccine therapy, appends a table of the results obtained by various authors with vaccines in enteric fever.

<sup>1</sup> Public Health Report, P. H. and M. H. S., May 19, 1911.

<sup>2</sup> Boston Medical and Surgical Journal, 1911, vol. clxiv, p. 8

<sup>3</sup> Journal of the American Medical Association, 1910, vol. lv, p. 2023.

<sup>4</sup> American Journal of the Medical Sciences, 1911, vol. cxli, No. 2.

## TYPHOID FEVER

Authors.	Cases.	Results.
Richardson . . . . .	40	Five per cent. relapsed; 163 cases not inoculated; 21.4 per cent. relapsed.
Illman . . . . .	1	Not benefited.
Watters . . . . .	30	Had mild course. One case not benefited.
Watters . . . . .	4	Had mild course.
Smallman . . . . .	36	Generally a mild course. Three deaths.
Semple . . . . .	9	Generally a mild and short course. All recovered.
Nichols . . . . .	11	Generally mild; no deaths; 2 relapses.
Richardson . . . . .	28	Only one relapsed.
Raw . . . . .	9	No marked effect; 2 died.

## CARRIER CASES.

Irwin and Houston . . . . .	1	Cured.
Houston . . . . .	3	Two cured; one markedly improved.

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The treatment of typhoid fever by bacterial vaccines, Stoner remarks, has not met with very marked success as yet, and the results claimed by various authors are at variance. Richardson has not noted any marked improvement due to the treatment, but thinks that relapses are largely prevented. Other observers do not note this fact, but are of the opinion that when treated with vaccines the disease has a much milder course. In the 34 cases treated by Watters and Eaton the temperature became normal in 1 case on the eighth day, in 1 on the eleventh, 1 on the twelfth, 1 on the fourteenth, 2 on the sixteenth, 2 on the seventeenth, 3 on the eighteenth, 1 on the twentieth, 2 on the twenty-first, 4 on the twenty-second, 1 on the twenty-fourth, 1 on the twenty-sixth, 1 on the twenty-seventh, and 2 on the twenty-eighth day of the disease. Two of the cases that reached normal on the seventeenth day had relapses, and several cases did not respond at all. These authors compare the death rate of 31 cases treated with vaccines to that of 46 others that received routine treatment only. In the former the death rate was 3.2 per cent., while in the latter it was 11.1 per cent. Two of the cases treated by Semple with autogenous vaccines had normal temperatures on the eighteenth and nineteenth days respectively.

In the treatment of carrier cases of typhoid fever, vaccine therapy, adds Stoner, may prove of untold value, if further investigations give results similar to the ones tabulated. The case reported by Irwin and Houston occurred in a domestic who had had typhoid fever seven years previously. In the interval 6 people in families in which she worked contracted typhoid fever. An examination of her stools and urine revealed the presence of many typhoid bacilli in the latter. She was treated with urinary antiseptics, tonics, and rest for five weeks, at the end of which time the bacilli were still present in the urine. An autogen-

ous vaccine was prepared, and after the fourth injection the organisms disappeared from the urine. The subsequent examinations of the stools and urine were negative, and a marked improvement in the general health of the patient resulted.

**VACCINES IN PUERPERAL SEPSIS.** Fifty cases of puerperal sepsis treated with vaccines are reported by Watters and Eaton.<sup>1</sup> They include all patients who have been treated, the good and the bad, the early and the late. A few of the patients received antipartum prophylactic injections because of bacteriological findings or unusual opportunities for possible infection. These all recovered. Others likewise received prophylactic injections that showed pure cultures of streptococcus in the uterus post partum, but without any clinical symptoms of sepsis. Of the 50 cases reported, 4 patients died within twenty-four hours after the treatment, being practically beyond hope of recovery when treatment was instituted. Three other patients were moribund at the beginning of the treatment, but life was possibly prolonged for two or three days. Excluding these 7 cases, there were 43 patients, of whom, 41 recovered. The other 2 patients died after surgical intervention. The authors administered a polyvalent preparation immediately after the diagnosis was determined by bacteriological tests. This polyvalent preparation was superseded by an autogenous vaccine about twenty-four hours later. No injurious effects or aggravation occurred as a result of the injection. Watters and Eaton do not claim that the vaccines should replace other treatment, but that they should be used to assist the other methods. They advise, however, leaving the patient as free from manipulation or local treatment as possible. In their series of cases a hot vaginal douche usually was employed, but only in one or two instances was an intra-uterine douche used. Watters and Eaton prefer to draw no definite conclusions concerning the results of the treatment, although they think that two facts have been demonstrated by their work; one is that the treatment is harmless, the other is that patients have shown much improvement after the injections and have recovered when apparently hopeless.

Stoner<sup>2</sup> reviews the following reports:

<sup>1</sup> Boston Medical and Surgical Journal, 1911, vol. clxiv, 524.

<sup>2</sup> American Journal of the Medical Sciences, February, 1911, vol. cxli.



## PUERPERAL SEPTICEMIA

Authors.	Cases.	Cured.	Improved.	Remarks.
Lloyd . . . . .	2	0	2	
Floyd . . . . .	1	1	0	
Richardson . . . . .	2	1	0	1 not benefited.
Bristow . . . . .	2	2	0	
Martyn . . . . .	1	1	0	
Crowe . . . . .	1	1	0	
Turton . . . . .	3	1	1	1 not benefited.
Strubell . . . . .	1	0	1	
Oastler . . . . .	2	1	0	1 not benefited.
Leary . . . . .	47	43	0	4 not benefited.
White . . . . .	1	0	0	1 not benefited.
Hartwell . . . . .	18	18	0	
Hoobler . . . . .	3	3	0	
Oastler . . . . .	2	1	0	1 not benefited.
Sherman . . . . .	1	1	0	
	<hr/> 87	<hr/> 74	<hr/> 4	<hr/> 9 not benefited.

The results obtained by vaccine therapy in the treatment of puerperal septicemia, says Stoner, are particularly gratifying, especially in the 18 cases reported by Hartwell, Streeter, and Green, in which every case recovered. No less remarkable is the series of 47 cases treated by Leary, in which there were only 4 deaths. Leary states that in most of these cases vaccine therapy was only used as a last resort, and 2 of the cases were moribund when treatment was begun. Martyn's case had received three doses of antistreptococcic serum without the slightest effect before vaccine treatment was adopted, after which improvement took place rapidly.

**Vaccines in Rheumatic Diseases.** Ball reports in detail a few cases of rheumatoid arthritis that were favorably influenced by the use of streptococcus vaccines. Ball was impressed by the peculiar sapremic appearance of chronic rheumatic cases, and in some of them it was possible to trace in the history the onset of the disease following on some distinct infection, or subsequent to a chronic suppuration. He believes, from experience with a large number of cases, that the focus of infection can at times be ascertained, and although a few are probably due to specific microorganism, many cases are due to a general sapremia following from a localized seat of infection. He has seen many cases where the focus of infection has been found microscopically to contain chiefly streptococci. In some cases even, where no seat of infection, such as bad teeth, leucorrhea, intestinal putrefaction, and colitis, could be found, he has used the antistreptococcic serum with success. So many of these cases responded with such remarkable results that he thinks their use is justified in all doubtful cases. Even in a case of acute articular rheumatism following an attack of gonorrhea with subsequent

gleet he has had success, by the employment of antistreptococcic vaccines, where the injection of gonorrheal vaccines had failed.

**Yeast.** An ingenious method of treating the pruritus vulvæ of diabetes, based on the fermentation of glucose by yeast is described by Carnot.<sup>1</sup> The obstinate nature of this complication is well known. It is accompanied by erythema of the labia majora, which gives them a reddish-yellow and slightly dusky tint. As a result of scratching, ulcers form, usually between the labia majora and minora, on the inner surface of the labia majora, or the fourchette. These ulcers are reddish, painful, and pruriginous; they are attended by very little discharge, and are slow in evolution. The pruritus and erythema are due to the prolonged contact of the sugar-containing urine with the vulva. The treatment is general and local. General treatment, especially dietetic treatment, which ameliorates the diabetes, will also ameliorate the pruritus. The most important point in the local treatment is the prevention of the prolonged contact of the parts with the sugar-containing urine, which is accomplished by the careful use of lotions and injections after each micturition.

In a recent case of pruritus vulvæ, remarkable for its obstinacy and severity, which rendered life intolerable, Carnot obtained excellent results from the application of brewer's yeast. His object was to cause the sugar to disappear automatically from the inflamed parts. This he accomplished by means of a lotion applied to the vulva, and a vaginal injection made with a tablespoonful of fresh yeast in a liter of water. Not only was the irritating contact of the sugar with the inflamed parts prevented, but as the result of the fermentation it was replaced by a weak solution of alcohol, which had an antipruriginous and tonic action on the tissues. The injections and lotions were used twice daily, and this was the only treatment. The pruritus ceased on the second day, the inflammation subsided, and the ulcers rapidly healed. Carnot suggests that this simple method should be tried in the various external manifestations of diabetes—certain sores, gangrene, and stomatitis—wherever, in fact, the sugar can be made to disappear by fermentation.

<sup>1</sup> Progrès Médical, May 28, 1910.

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